Responsive Access, Small Cargo and Affordable Launch

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(Approved for Public Release, Distribution Unlimited)

AGENDA

- DARPA’s Charter & Commitment
- RASCAL Overview
  - Motivation / Vision
  - Philosophy / Concept
- Program Plan (all phases)
- Program Objectives and Goals
  - ConOps
  - MIPCC
  - RLV & ERV Descriptions
  - Interfaces
- Lunch - Networking

AGENDA (Cont'd)

- Acquisition Strategy
  - Source Selection Schedule
  - Funding
- Section 845 Description / Requirements
- Program Solicitation Overview (Phase 1)
  - Proposal
  - Evaluation Process
  - Evaluation Category / Areas
  - Agreement Documents
  - Summary
- Question and Answers
- Social Hour
- Friday: One-on-one 8:30 – 5:00 @ CENTRA Technology

HAND OUT PACKAGE

- RASCAL INDUSTRY DAY BRIEF (hard copy)
- CD-ROM
  - Draft RASCAL Program Solicitation
  - Attendees List
  - RASCAL Industry Day Brief
  - Background MIPCC Turbo-Jet
  - Background PHM Technology
  - DoD O&S Definition

DARPA
2001

Dr. Tony Tether
Director, DARPA

DARPA ORGANIZATION

Director, Tony Tether
Deputy Director, Jane Alexander

Tactical Technology
Allen Adler
Art Morrish

Air, Space, & Land Platforms
Laser Systems
Future Combat Systems
Planning / Logistics

Special Projects
James Carlini
Amy Alving

Biological Warfare Defense Systems
Surface/Underground Target Engagement
Sensor/Navigation Sys

Advanced Technology
Tom Meyer
William Jeffrey

Assured C3ISR
Maritime
Early Entry / Special Forces

Information Systems
William Mularie
Kathy MacDonald

Asymmetric Threat

Defense Sciences
Michael Goldblatt
Steven Wax

Bio Warfare Defense Technologies
Biology
Materials & Devices
Mathematics

Information Technology
Kathy MacDonald
Janos Sztipanovits

Architectures & Designs
Computer Processing & Storage
Networks
Human Computing Interfaces

MicrosystemsTechnology
Robert Leheny
Dave Honey

Electronics
Optoelectronics
MEMS
Combined Microsystems

Total Personnel **220** ***Technical Personnel*** **129**

APPROACH

Staff

- Smart; risk takers - passionate about making a difference; energy to see their idea adopted
- Rotate frequently. Refresh and renew ideas, perspectives, technology and techniques
- Hiring Flexibility - Sec 1101 (FY 99)

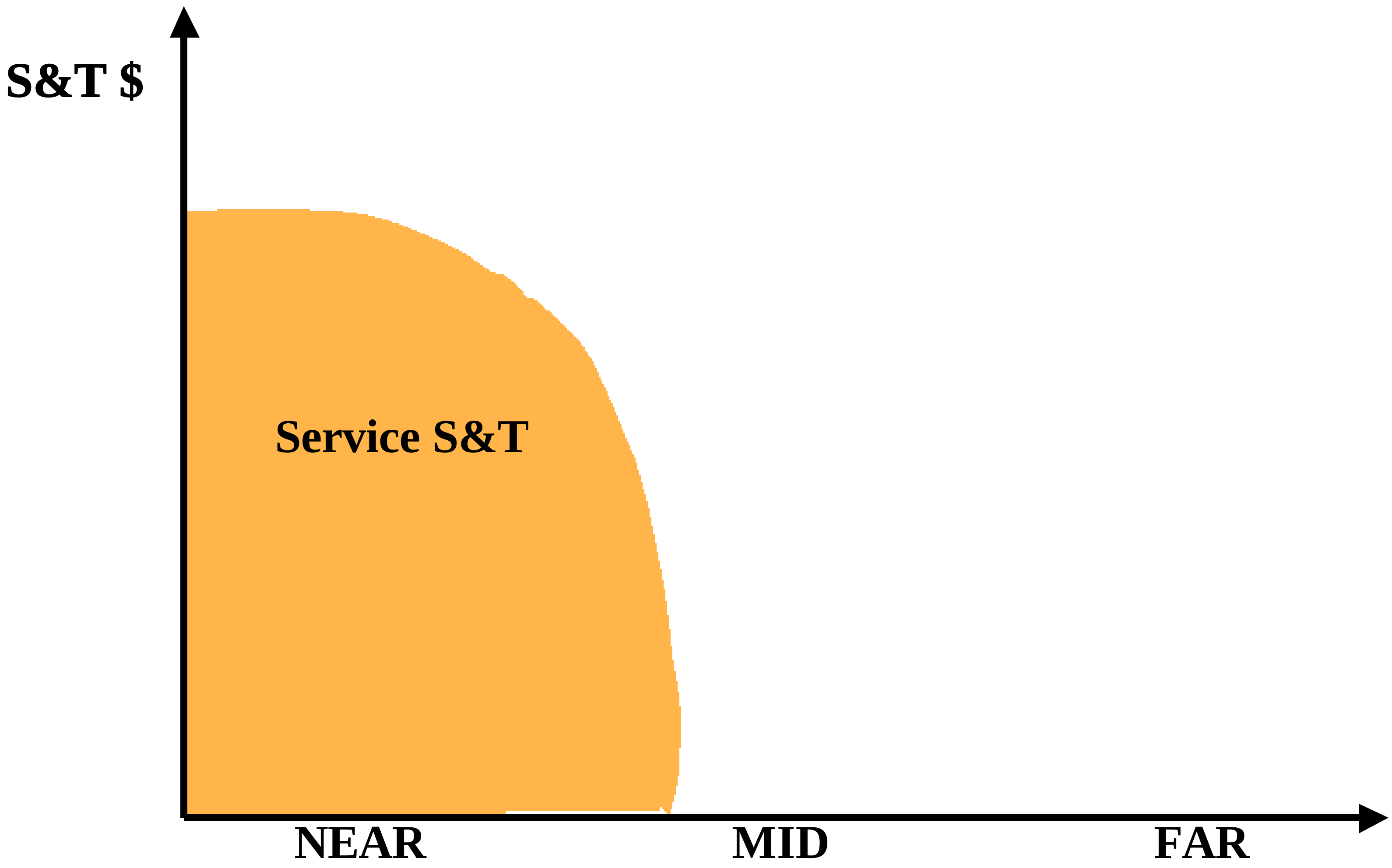
Resources

- $ and knowledge of important problems – able to quickly build coalitions

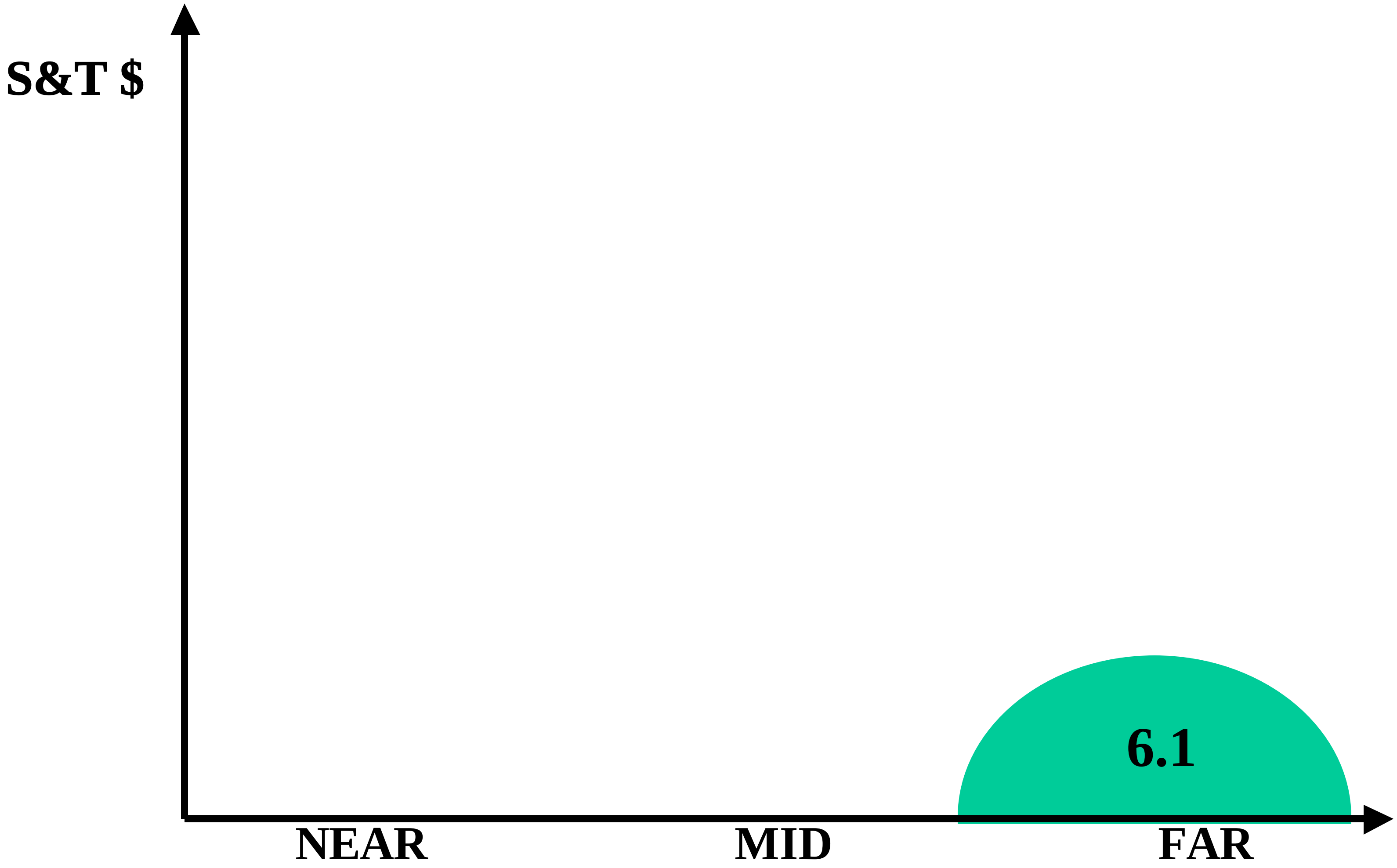
Freedom to Act

- Business practices that enable speed
  - Sec 845 (FY 94)
- Few long-term commitments

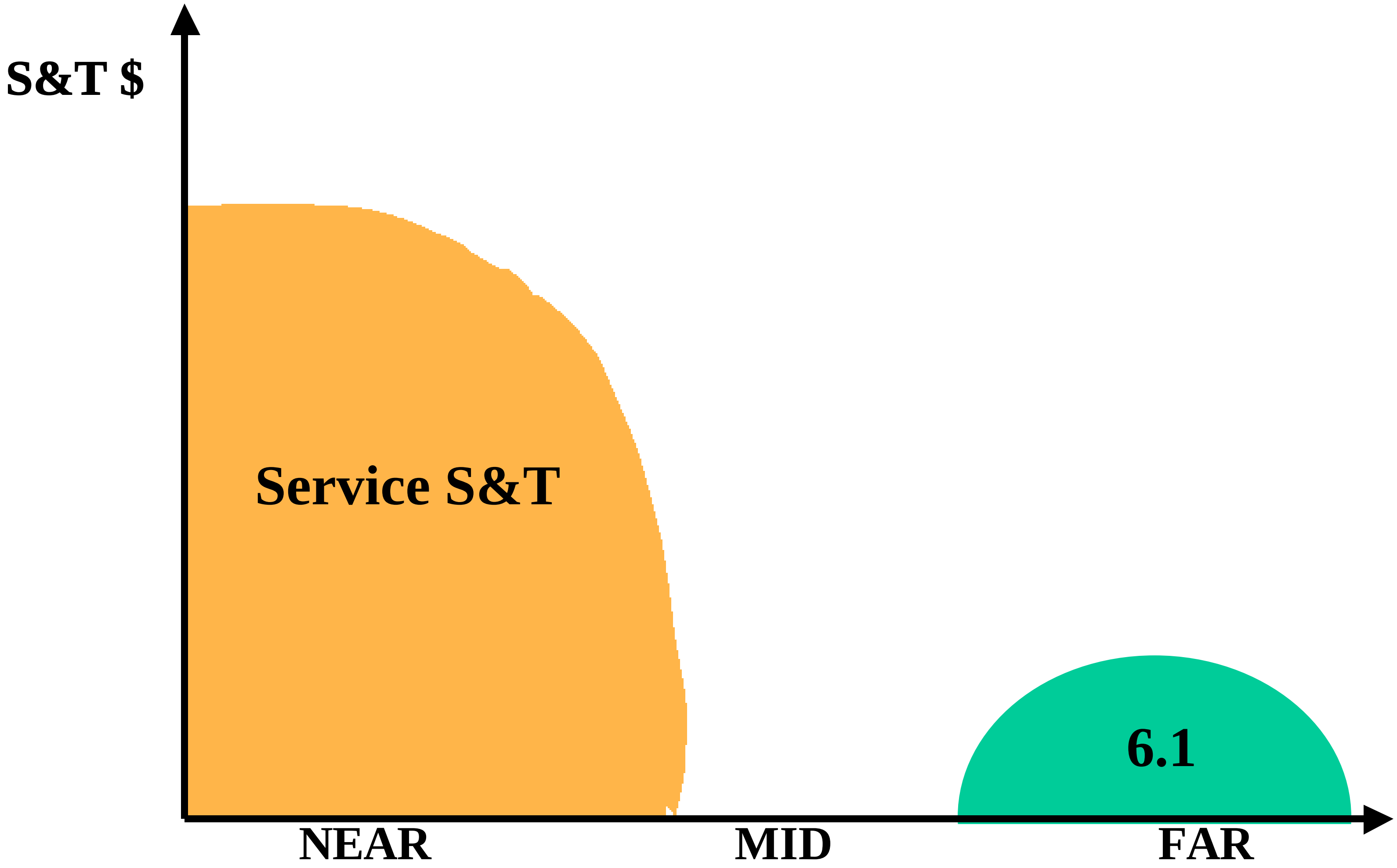
DARPA'S ROLE IN THE S&T PROCESS



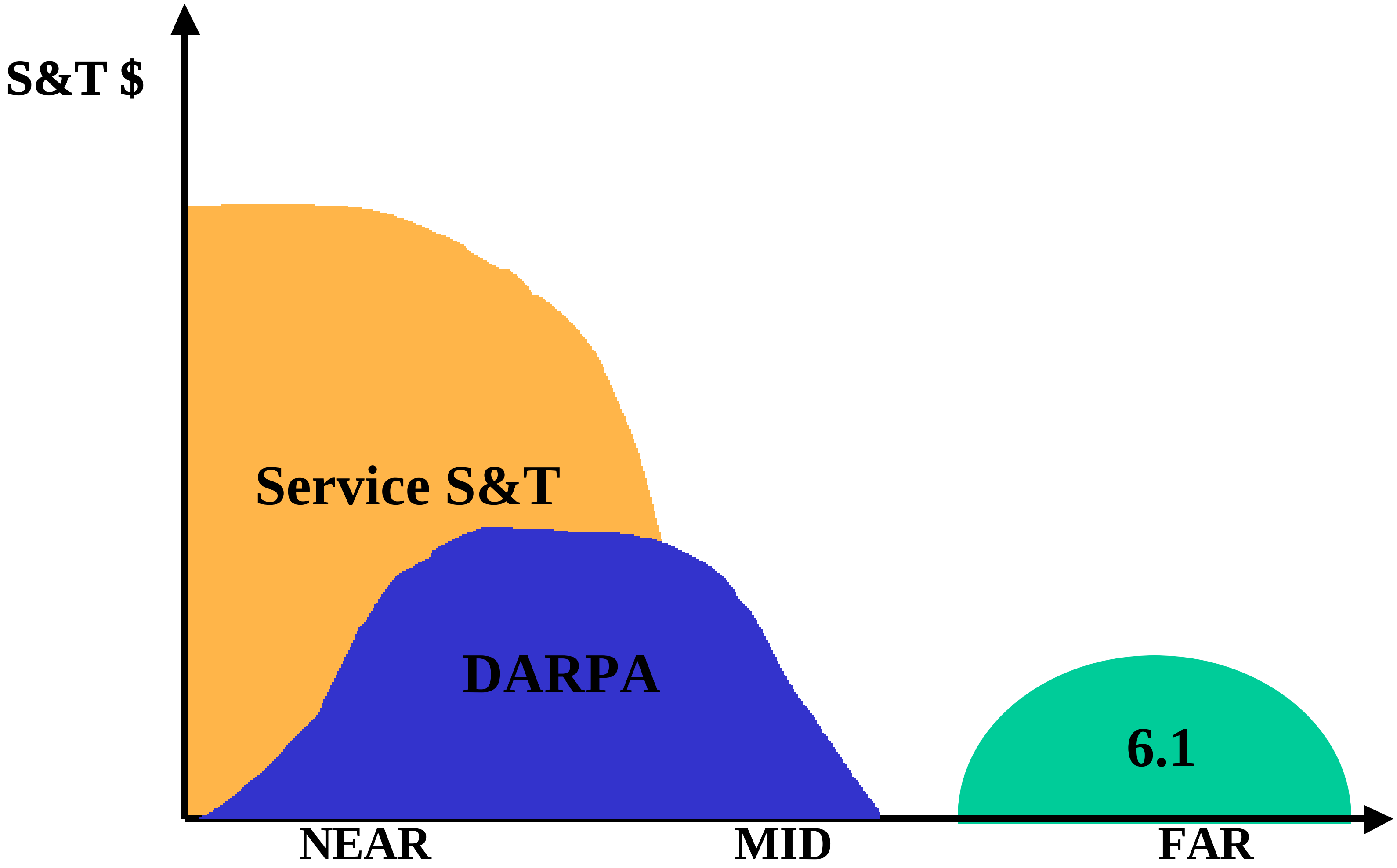
DARPA’S ROLE IN THE S&T PROCESS



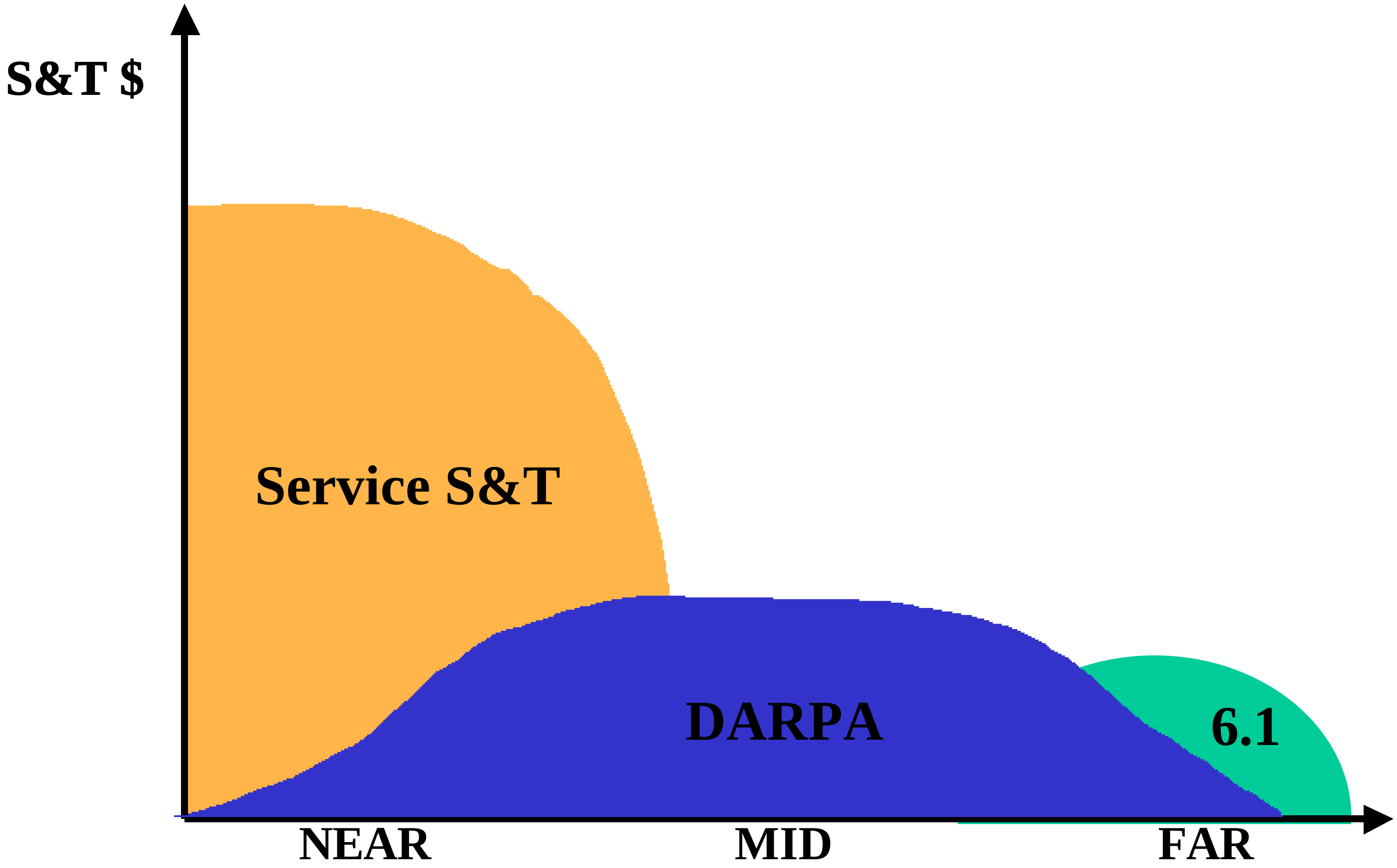
DARPA'S ROLE IN THE S&T PROCESS



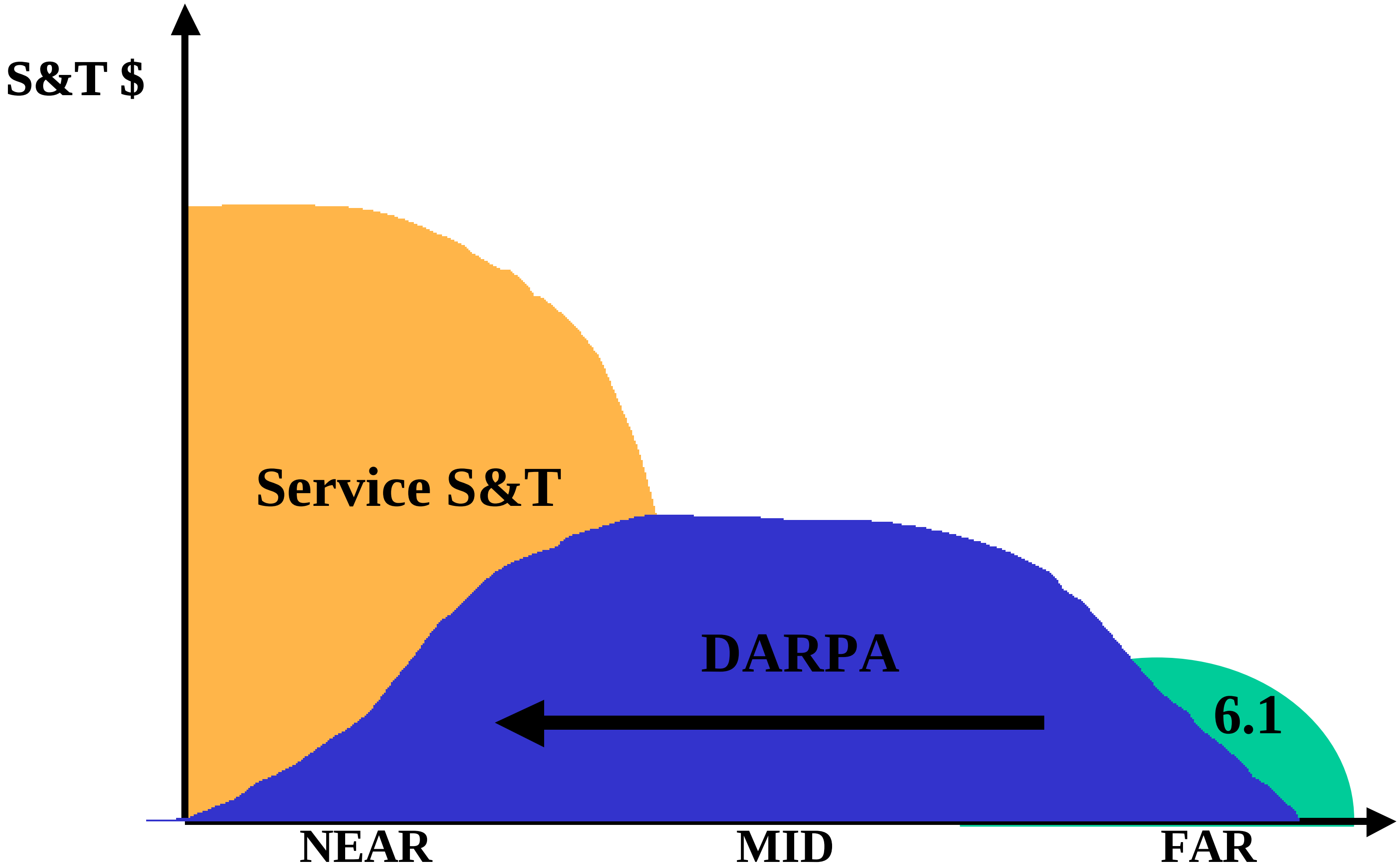
DARPA'S ROLE IN THE S&T PROCESS – 1990s



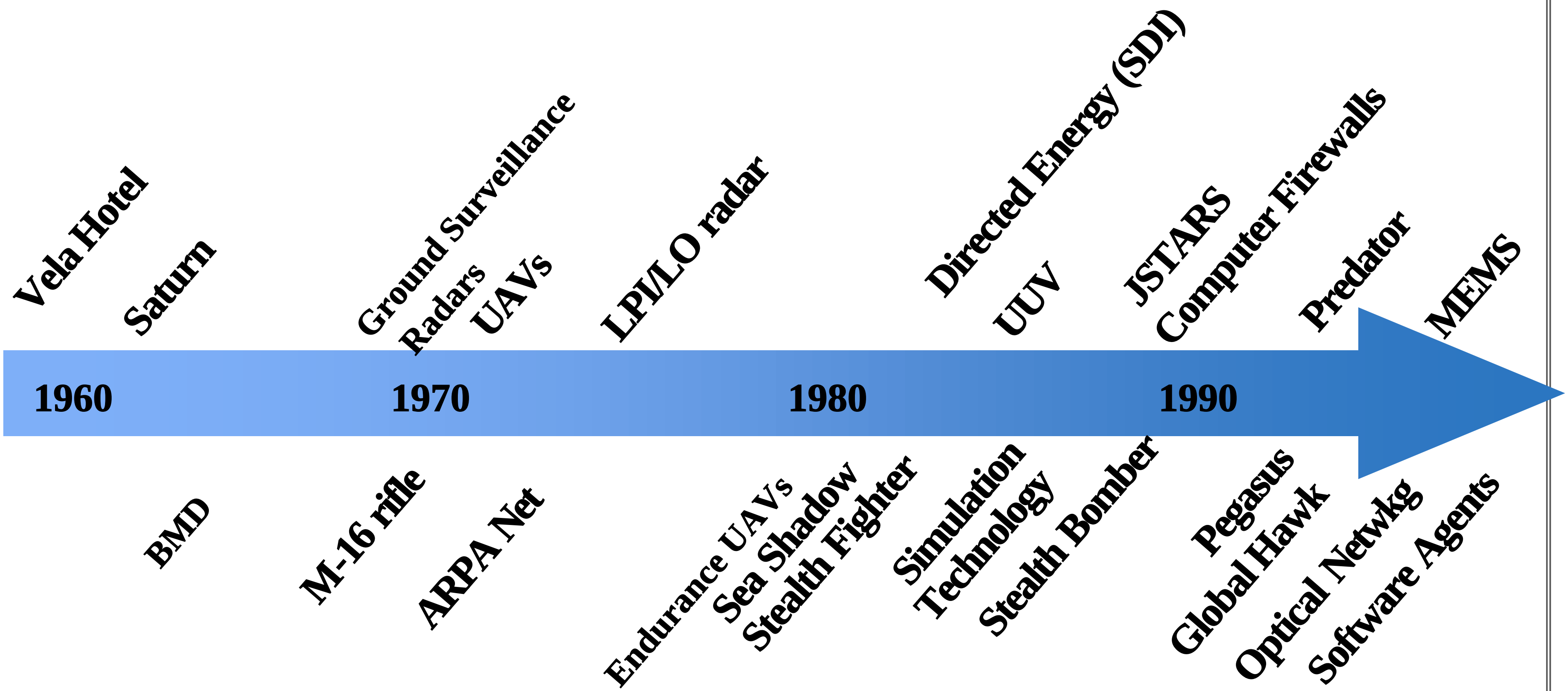
DARPA'S ROLE IN THE S&T PROCESS - 2001



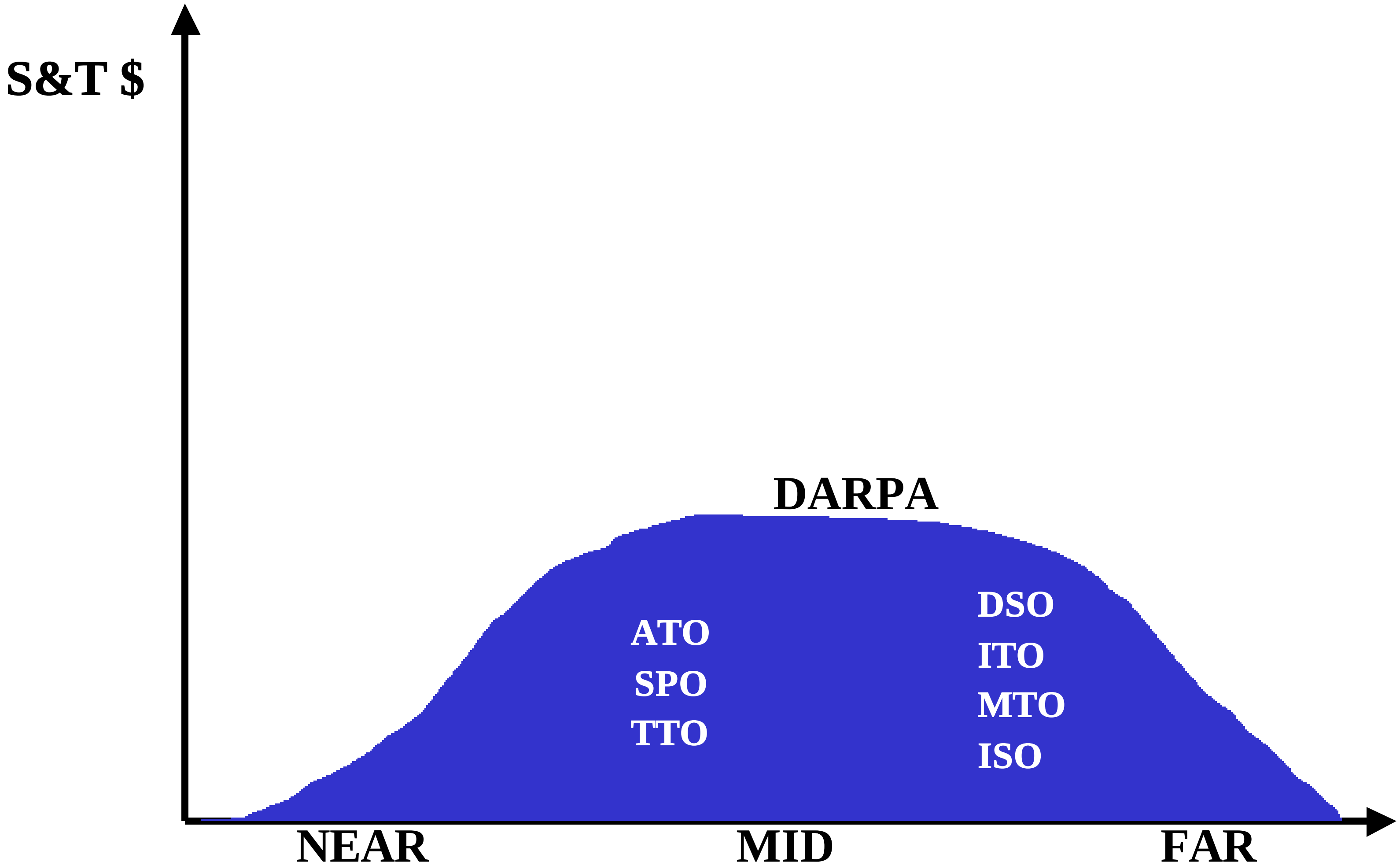
DARPA'S ROLE IN THE S&T PROCESS



DARPA ACCOMPLISHMENTS

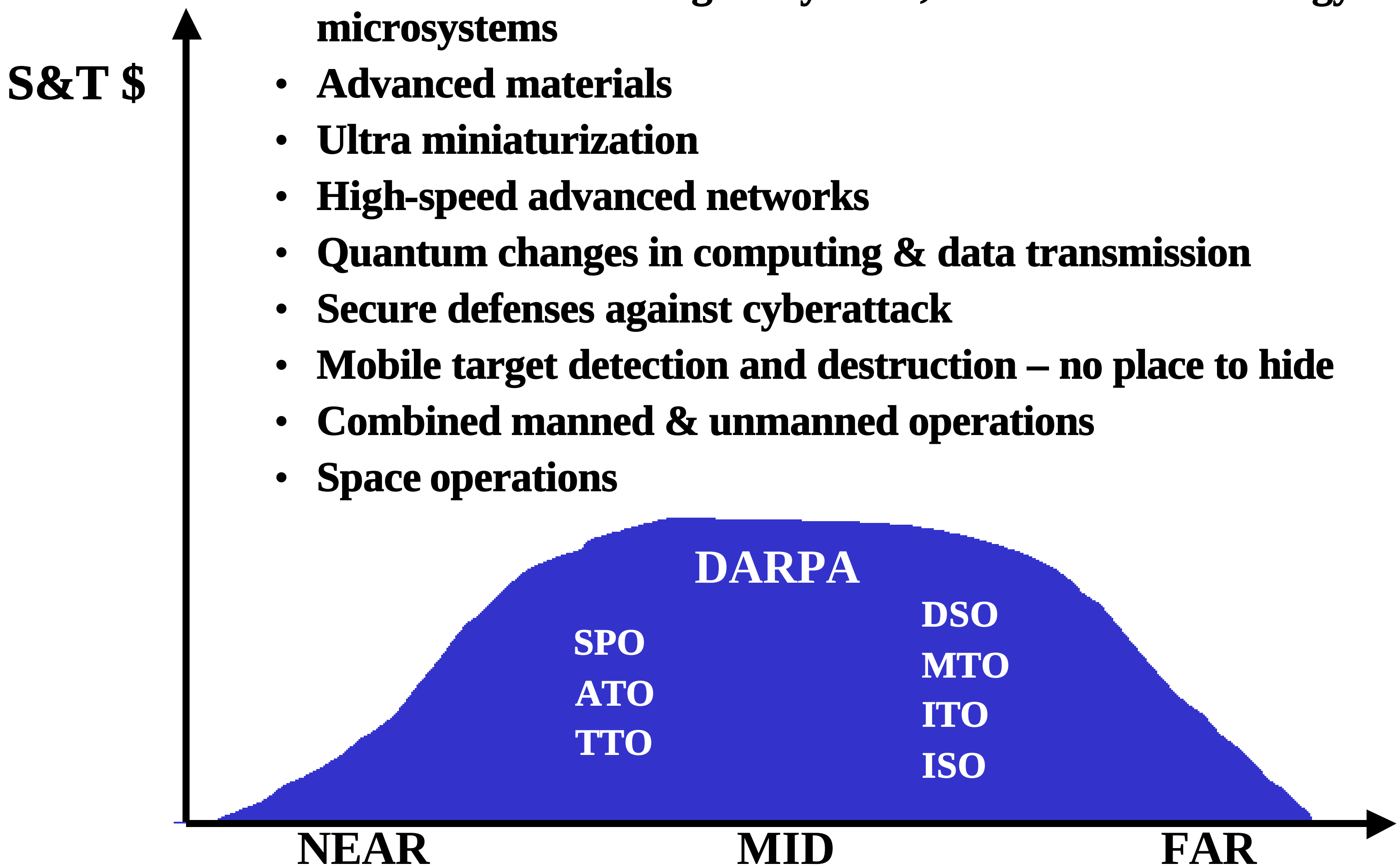


TECHNOLOGY FLOW



2001+: Potential Future Breakthrough Concepts and Technologies

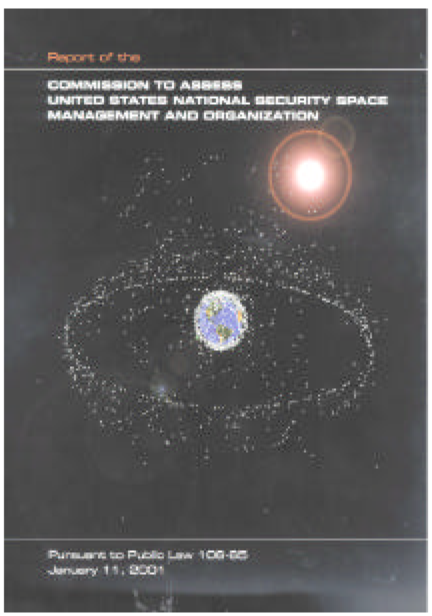
- **Integrated biological warfare defense**
- **Combination of biological systems, information technology & microsystems**
- **Advanced materials**
- **Ultra miniaturization**
- **High-speed advanced networks**
- **Quantum changes in computing & data transmission**
- **Secure defenses against cyberattack**
- **Mobile target detection and destruction – no place to hide**
- **Combined manned & unmanned operations**
- **Space operations**



DARPA's RASCAL MOTIVATION

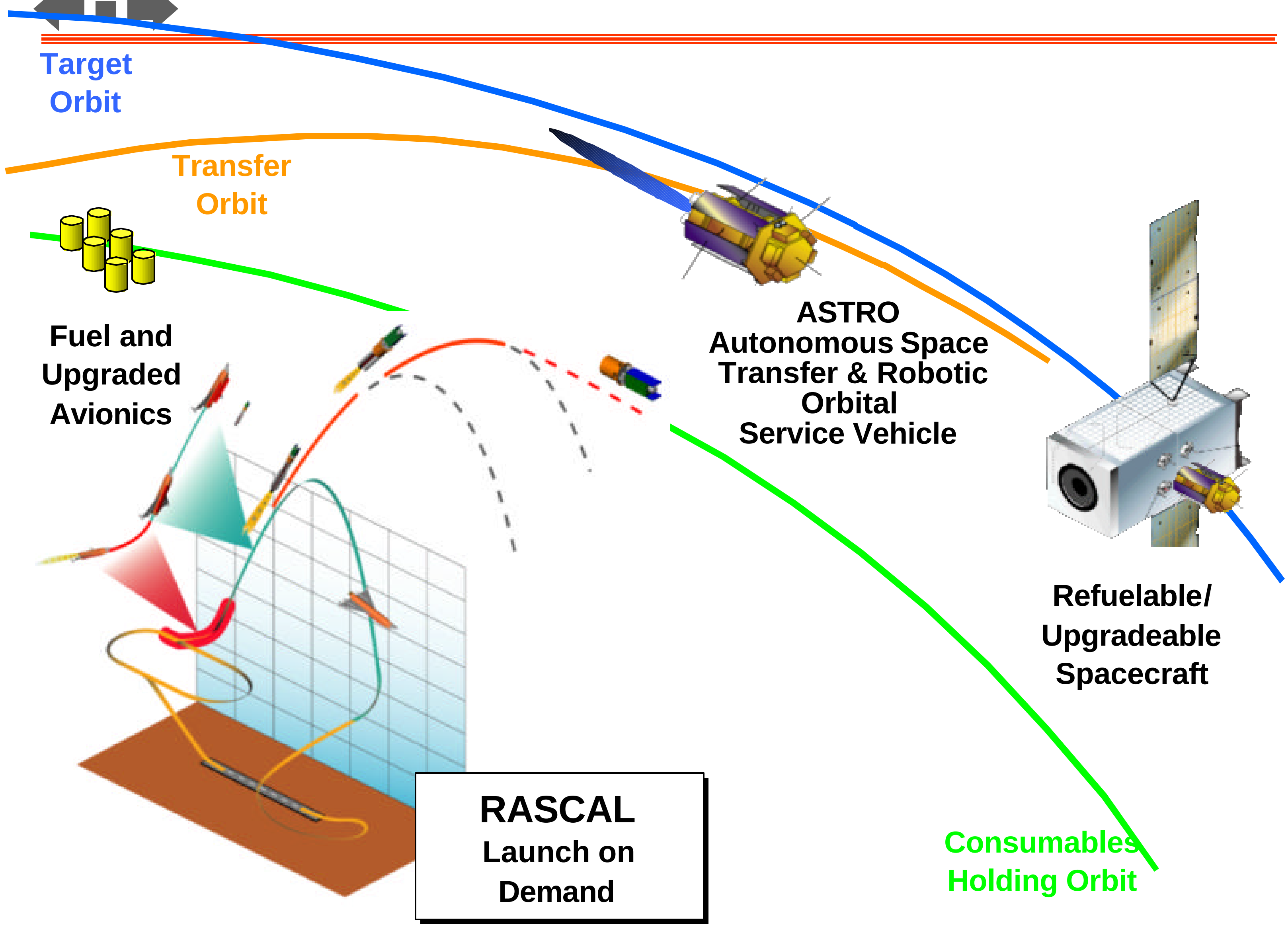
"United States deterrence and defense capabilities depend critically on assured and timely access to space. The U.S. Should continue to pursue revolutionary reusable launch vehicle technologies and systems even as the U.S. moves to the next generation of expendable launch vehicles…. One key objective of these technological advances must be to reduce substantially the cost of placing objects and capabilities in orbit…."

Secretary of Defense Donald H. Rumsfeld



***Report of the Commission to Assess United States National Security Space Management and Organization*, January 11, 2001.**

RASCAL ACCESS TO SPACE



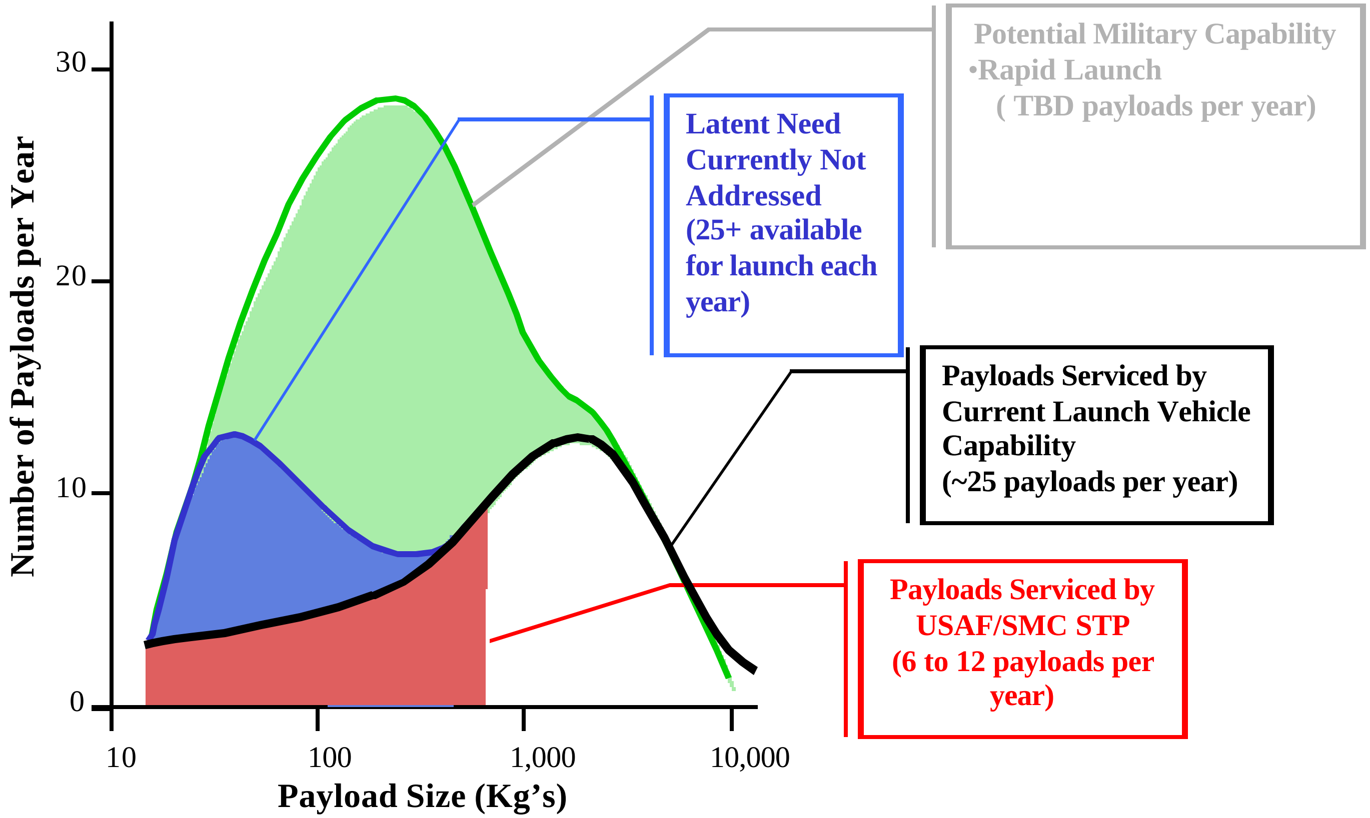
RASCAL Overview

DARPA'S OBJECTIVE

Provide the United States military the ability to quickly launch space assets in support of tactical theatre commanders by developing and demonstrating a rapid, routine, small payload delivery system capable of providing flexible access using a combination of reusable and low cost expendable vehicle elements.

MOTIVATION

Distribution of DoD Payloads



Insufficient small spacecraft launch capability exists today, inhibiting DOD's ability to utilize space effectively, efficiently and rapidly.

LAUNCH ELEMENTS

Notional Vehicle Design

Reusable 1st stage launch vehicle

- **Free from launch pads & ranges**
- **Able to access all inclinations**
- **Resilient against launch denial**

Payload Satellite

- **Rapid delivery and operation**
- **Lower acoustic loads during ascent**

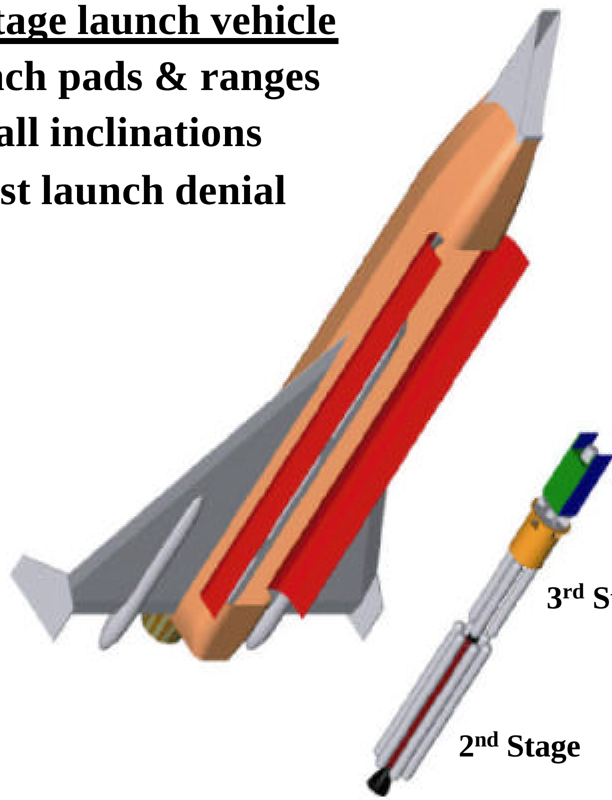


Illustration of the 1st Staging Event

Expendable Rocket Vehicle

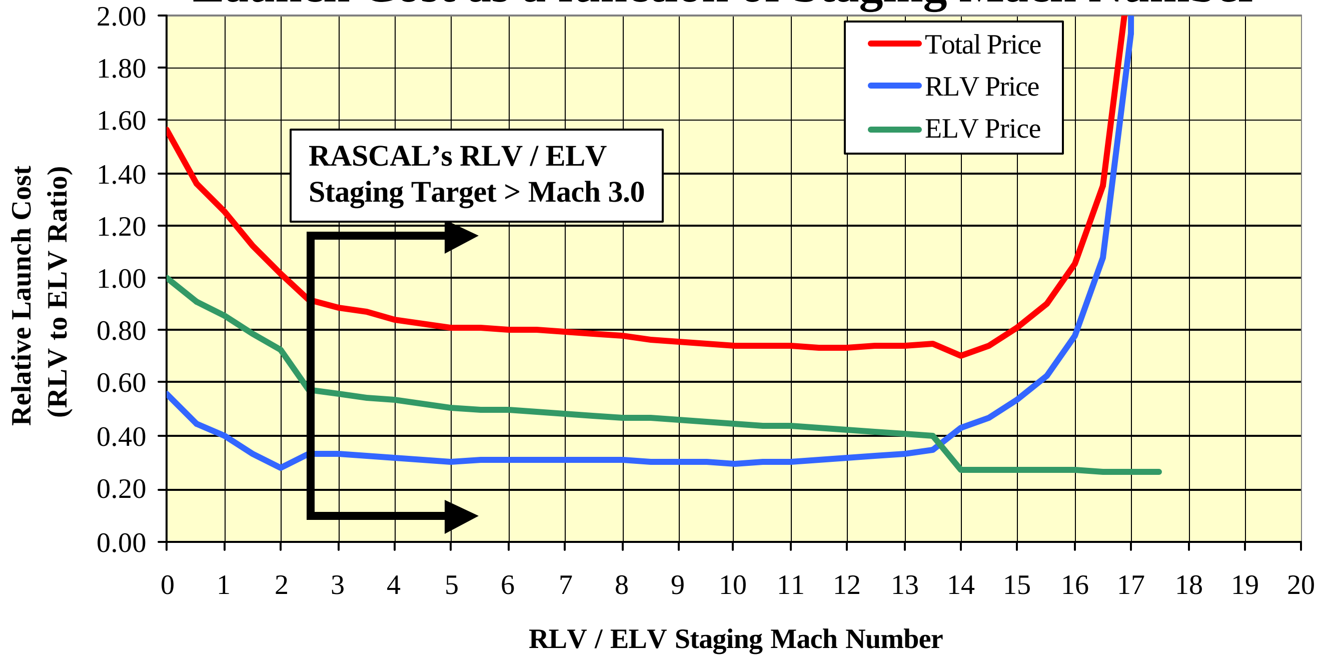
- **Improved performance at lower cost**
- **Designed without aerodynamic constraints**
- **No payload fairing required**

“R” IN RASCAL =
RESPONSIVE, ROUTINE & RELIABLE

- **Responsive**
  - Freedom from launch pads
  - Freedom from ranges
  - Uploading of ERV like hanging tactical ordnance
- **Routine**
  - Cost ≈ Tomahawk
  - Aircraft-like ops
  - Short lead time to integrate
- **Reliable**
  - Benign vibration & acoustic environment enhances reliability of payloads
  - Fewer components (e.g. no fairing, no thrust vectoring, no aerodynamic surfaces) enhances upper stage reliability
  - Ultimate high launch rates feed into manufacturing/QA, leading to inherent high reliability (1st stage ≈ commercial aircraft, 2nd stage ≈ tactical missile)

EXO-ATMOSPHERIC STAGING REDUCES COSTS

Launch Cost as a function of Staging Mach Number



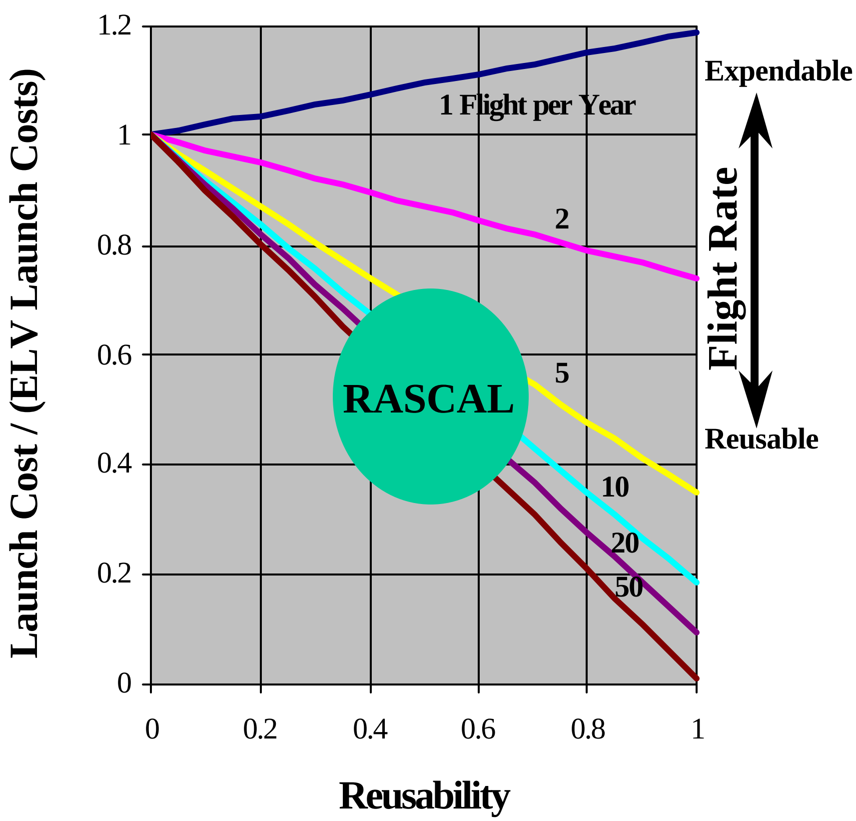
- **Exo-Atmospheric staging of the ERV provides a cost advantage**
  - Expendable vehicle is smaller; therefore, recurring cost is lower
  - Payload fairing is not required; therefore, no cost is incurred
  - Aerodynamic consideration in ERV design are removed; therefore, development cost is reduced
- **RASCAL target: Staging Mach Number >Mach 3.0**

EXO-ATMOSPHERIC ADVANTAGES

- **Reduces the amount of expendable mass**
  - Reduces the performance & size of the ERV
  - Eliminates the need for a payload fairing
  - reduces recurring cost
- **Reduces the size of the reusable vehicle**
  - Reducing the non-recurring cost of development
  - Reducing the recurring cost of manufacture & maintenance
- **Reduces launch risk**
  - Avoids difficult flight regions
  - Reduces complexity
- **Enables evolution of better reusable vehicles**
  - Vehicle architecture and design not limited by atmosphere
  - As propulsion technology improves, so will the system performance

REUSABILITY AND FLIGHT RATE

- Flight rate enables potential cost savings from reusability
- Expendable launch vehicles are justified if the flight rate is only a few flights a year
- Any level of reusability is justified as the flight rate grows beyond about 5 flights a year
- Small payloads can support a high flight rate
  - Growth in small payload applications
  - No competing small launch vehicles



RASCAL's Goal is to achieve 50% reusability

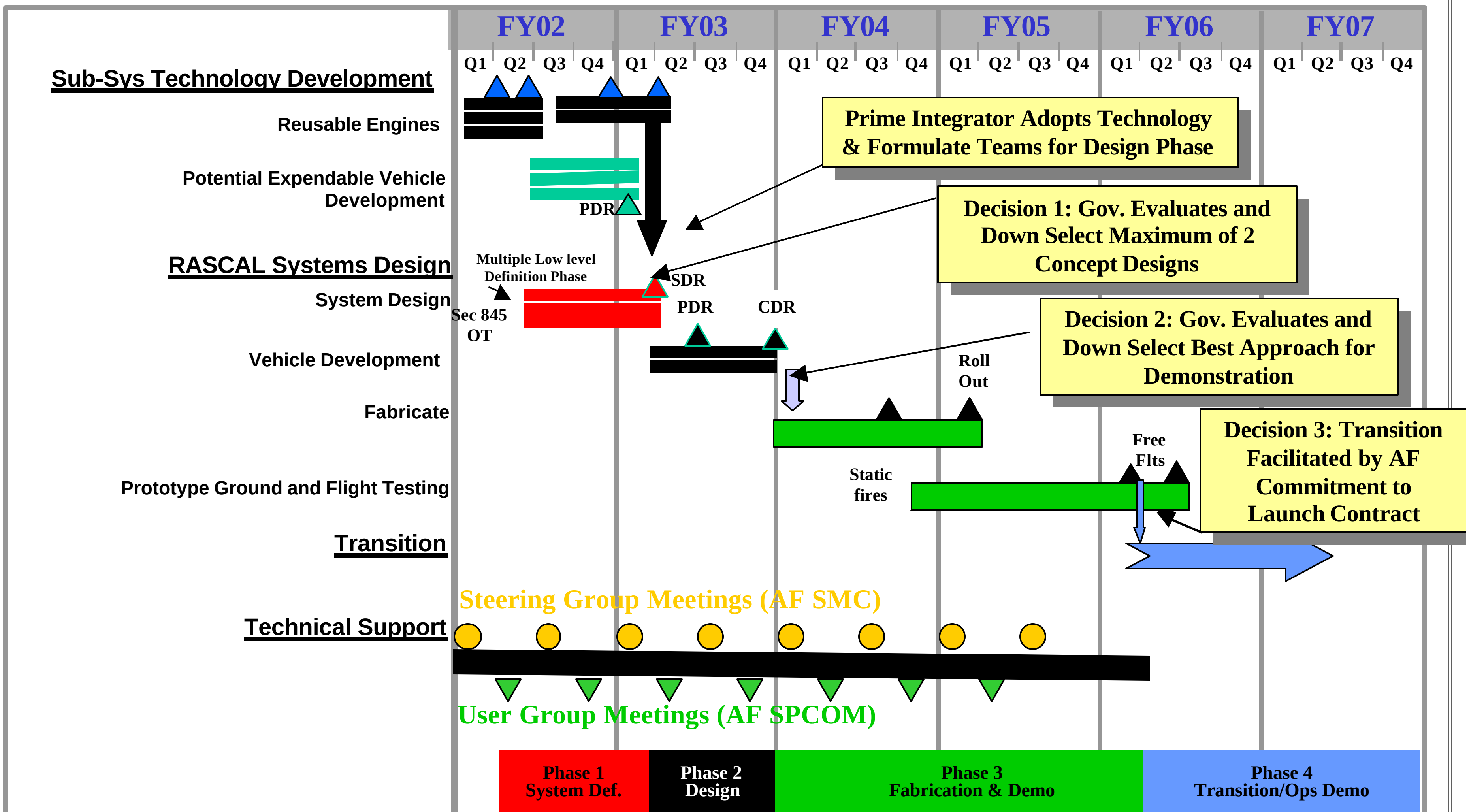
The launch of small payloads should provide enough flight rate to support RASCAL reusability

RASCAL Program Plan

PROGRAM PHILOSOPHY

- Develop a responsive, flexible launch system with the best performance and mission adaptability available for a total recurring mission cost of $750,000 / launch or less
- Rolling Down Select Using Agreements Authority (cost share)
- Three Phase Program:
  - Phase I: ConOps, System Level Design, Multiple Awards, 6 months
  - Phase II: Final Cost Assessment and Critical Design, 2 awards
  - Phase III: Cut Metal, Assemble, Flt Test & Transition / Single Award
- Program Requirements
  - Responsive
    - Flexible: typical military airfield, aircraft like CONOPS
    - Rapid: One day turn around
  - Total mission cost of $750,000 or less
    - Aircraft like reusable first stage
    - Turbojet based boost propulsion in the form of a MIPCC installation
    - Exo-Atmospheric boost of the first stage

RASCAL PROGRAM PLAN



PHASE I PRODUCTS

- Low Cost Concept of Operation Defined
- Vehicle Design Trades
- System Level Design of ELV & ERV
- Initial Affordability Assessment and AUFP Audit Trail
- Statement of Objectives
- Task Description Document of Phase II
- Preliminary Phase III Scope
- Down Selection of two winning teams for phase II

PHASE II PRODUCTS

- Concept of Operation Finalized
- Critical Level Design of ELV & ERV
- Final Affordability Assessment and AUFP audit trail
- Draft System Specification
- Phase III Task Description Document
- Down Selection of Demonstrating contractor for System Flight Test

PHASE III PRODUCTS

- Manufacturing Drawing Package
- Manufacturing Transition Plan
- Mission 6-DOF Model
- RASCAL User's Guide
- Updated Ownership Cost Analysis
- Flight Test a Series of Demonstrator Launch Vehicles leading to a P/L Insertion Demonstration
- Operational Assessment
- Commercially Operated Launch Service or Procurement proposal for a RASCAL System
- Transition of Program Management to a Service

PROGRAM SCHEDULE AND FUNDING

Task Name	Start	Finish
Industry Brief	11/01/01	11/01/01
Solicitation Released	12/01/01	12/01/01
Proposals Due	1/30/02	1/30/02
Agreements Awarded		
Phase I	03/02	11/02
Phase II	12/02	12/03
Phase III	12/03	09/06

Timeline columns: FY02, FY03, FY04, FY05, FY06 (each Q1, Q2, Q3, Q4)

Funding Available to Industry

Phase I → $4-6M in FY02

Phase II → $10-12M in FY03

Phase III → $60-70M in FY04-06

Total = $74-$88M over 5 years

(figures are tentative and/or notional)

Introduction of Participants and Break (30 Minutes)

RASCAL Objectives and Goals

OBJECTIVES & APPROACH

- Develop and demonstrate a rapid, routine, small payload delivery system capable of providing flexible access to space using a combination of reusable and low cost expendable vehicle elements.
- Design growth capability as technology is discovered and applied
- A Partnership with industry on the development of this revolutionary national capability
- Conduct the development & demonstration within contracted cost
- ConOps that exploit the design and operational freedoms from a fixed infrastructure at dedicated launch sites, airplane like maintenance, low cost propellants and munitions like ERV design, and autonomous range safety control / FTS system, COTS/MOTS
- Invest in technologies to reduce total ownership cost (I.e.,PHM…)
- RLV - MIPCC Turbo-jets
- Commercial, industrial, and corporate specifications and standards where appropriate

TOTAL MISSION COST

$750,000 Per Launch

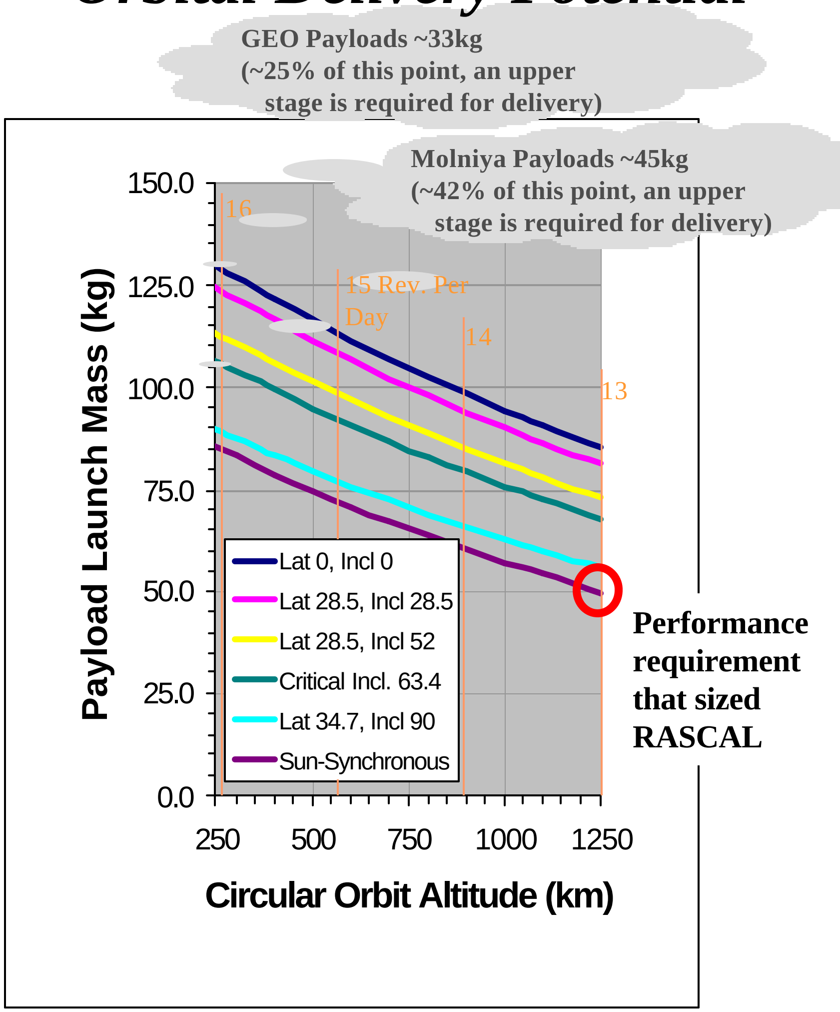
- FY03 dollars
- O&S RLV & ERV Cost (w/o Satellite)
- ERV Fly Away Unit Cost (xx production run)
- Range support cost

PERFORMANCE OBJECTIVE

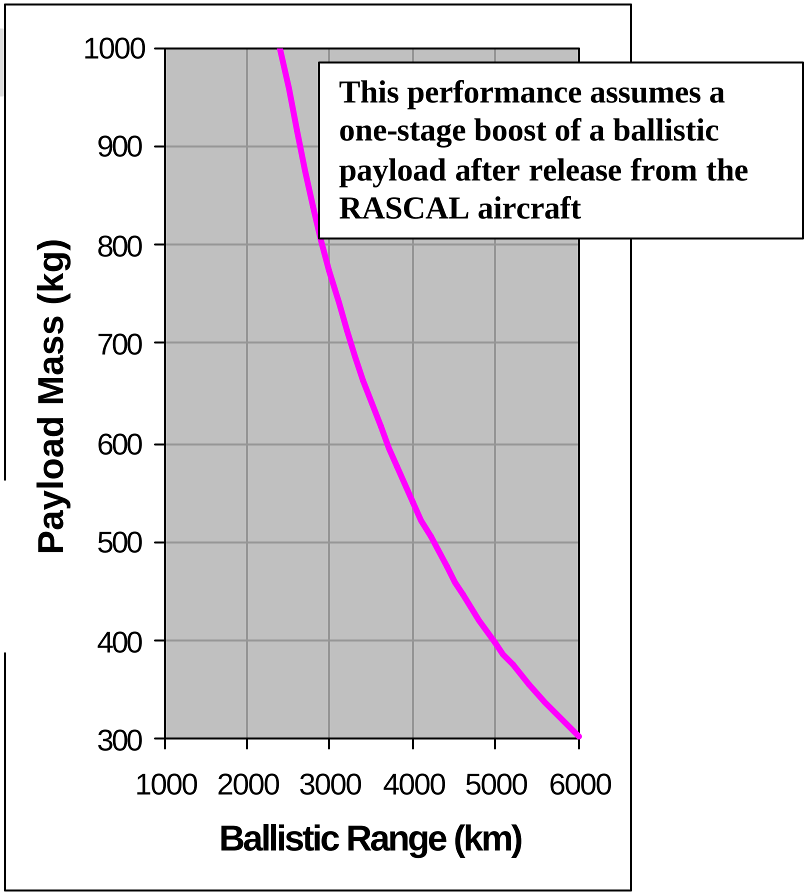
- Deliver payload of 75 Kg in to a 500 km sun synchronous orbit
- Validate ability to operate from a 2500 meter runway with normal GSE and independent of launch ranges
- Validate predicted operational mission cost of less then $750K / launch in FY 2003 funds (not including satellite payload cost)
- Demonstrate exo-atmospheric staging
- Mission turn-around time within a 24 hour period after payload arrival
- Mission scramble capability within an hour of notification, after ERV integration.
- Able to loiter and adjust flight path to dynamic mission planning

ORBITAL & BALLISTIC PERFORMANCE

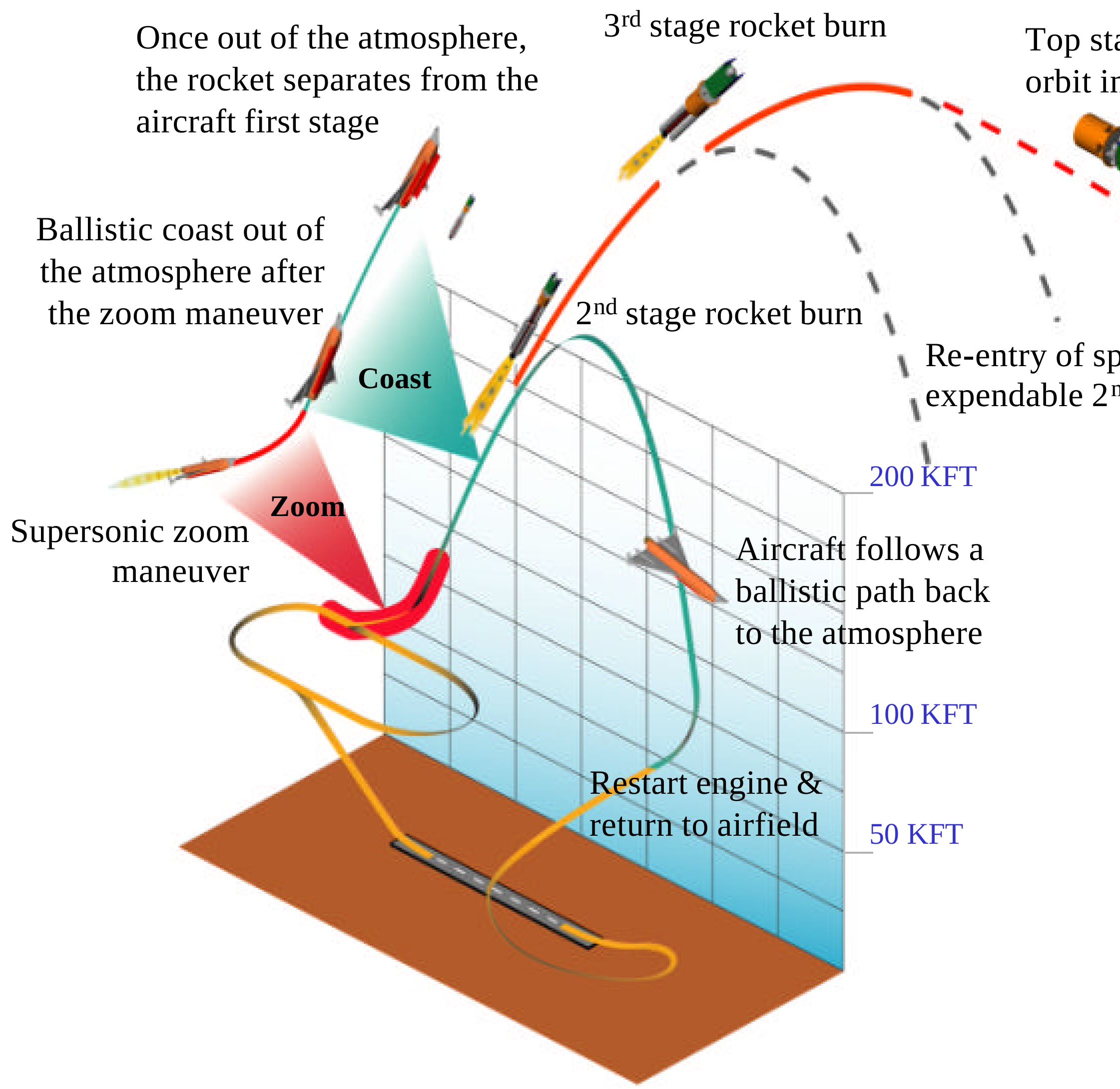
Orbital Delivery Potential



Ballistic Delivery Potential

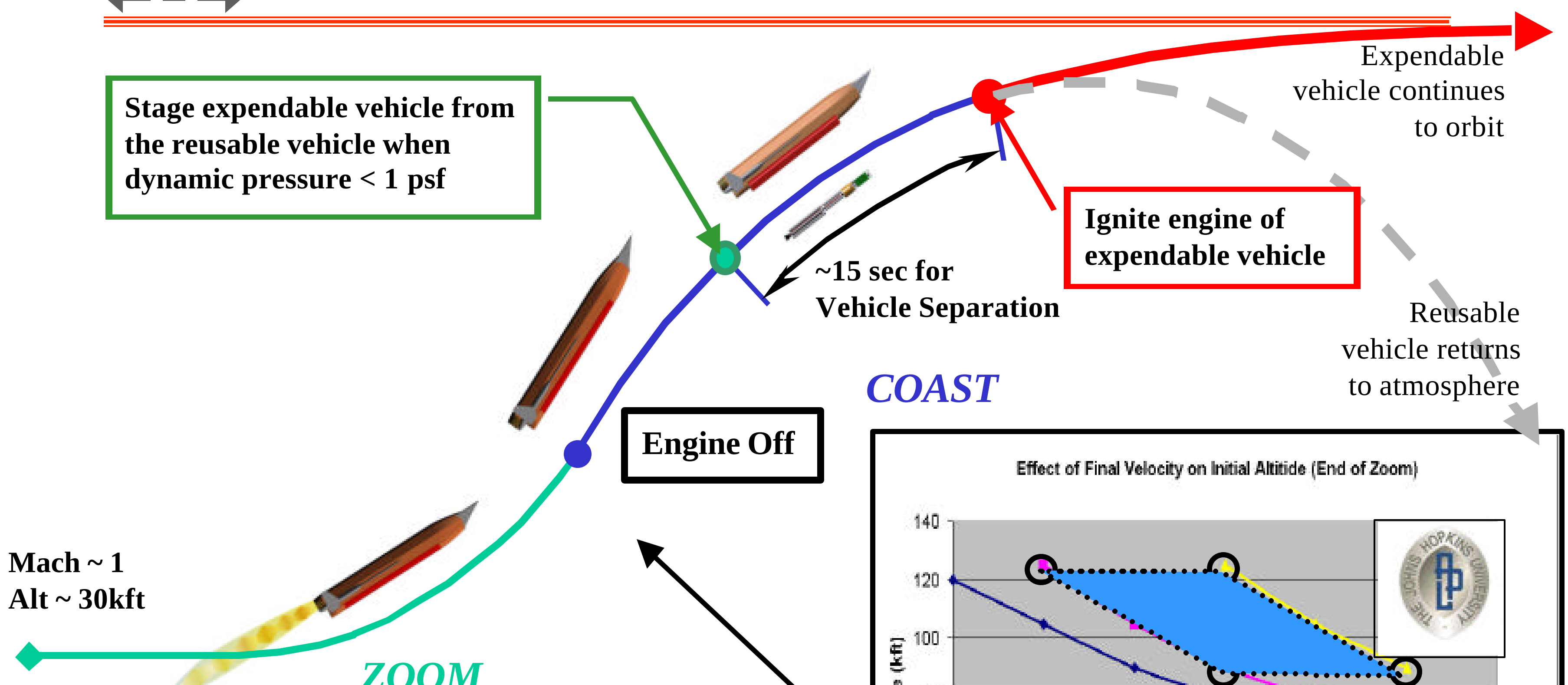


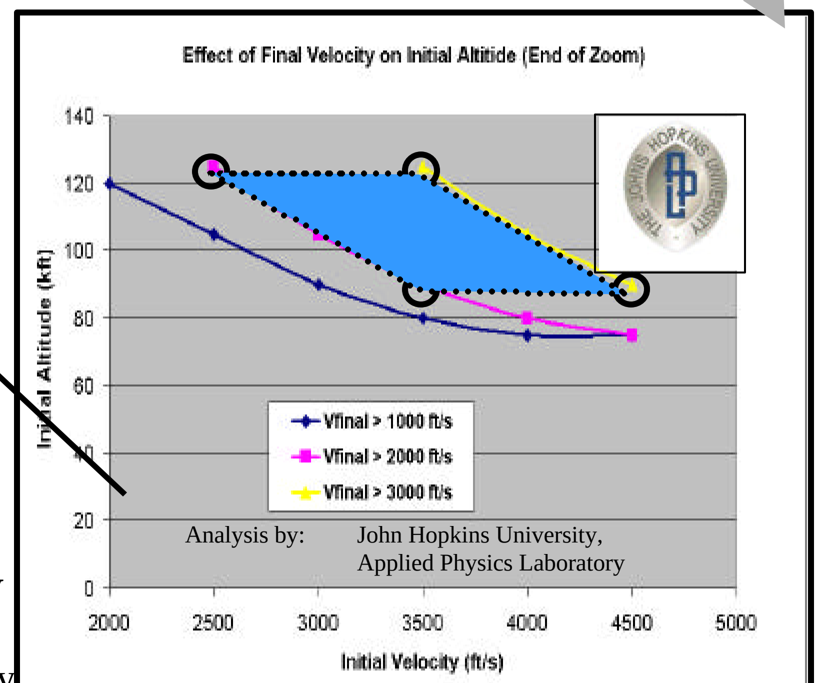
CONCEPT OF OPERATIONS



- **RASCAL CONOPS has the flexibility common to aircraft**
  - ✓ **Routine, airfield based ops**
  - ✓ **Access to any orbit, any time**
- **The “Zoom” maneuver takes the aircraft and rocket out of the atmosphere**
  - ✓ **Rocket & payload are carried internal to aircraft**
  - ✓ **Are never subjected to high dynamic pressure loads**
- **Takeoff and landing are just like conventional jet aircraft**

ZOOM MANEUVER OVERVIEW



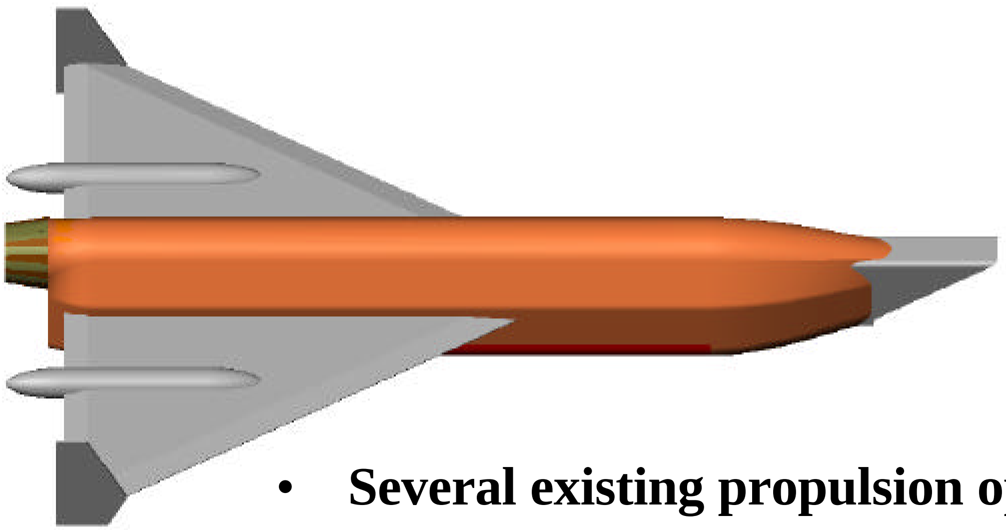


The "Zoom" maneuver requires the RLV engine to take the vehicle beyond Mach 2.5 and 90K ft altitude

- **Coast out of the atmosphere to RLV / ELV staging condition**
- **Coast 15 sec. past the staging event to provide RLV / ERV separation before ELV engine ignition**

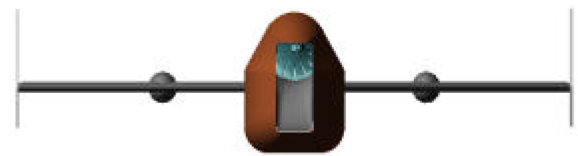
REUSABLE 1ST STAGE VEHICLE

Notional Vehicle Design



M_{GTOW} = 9375 kg

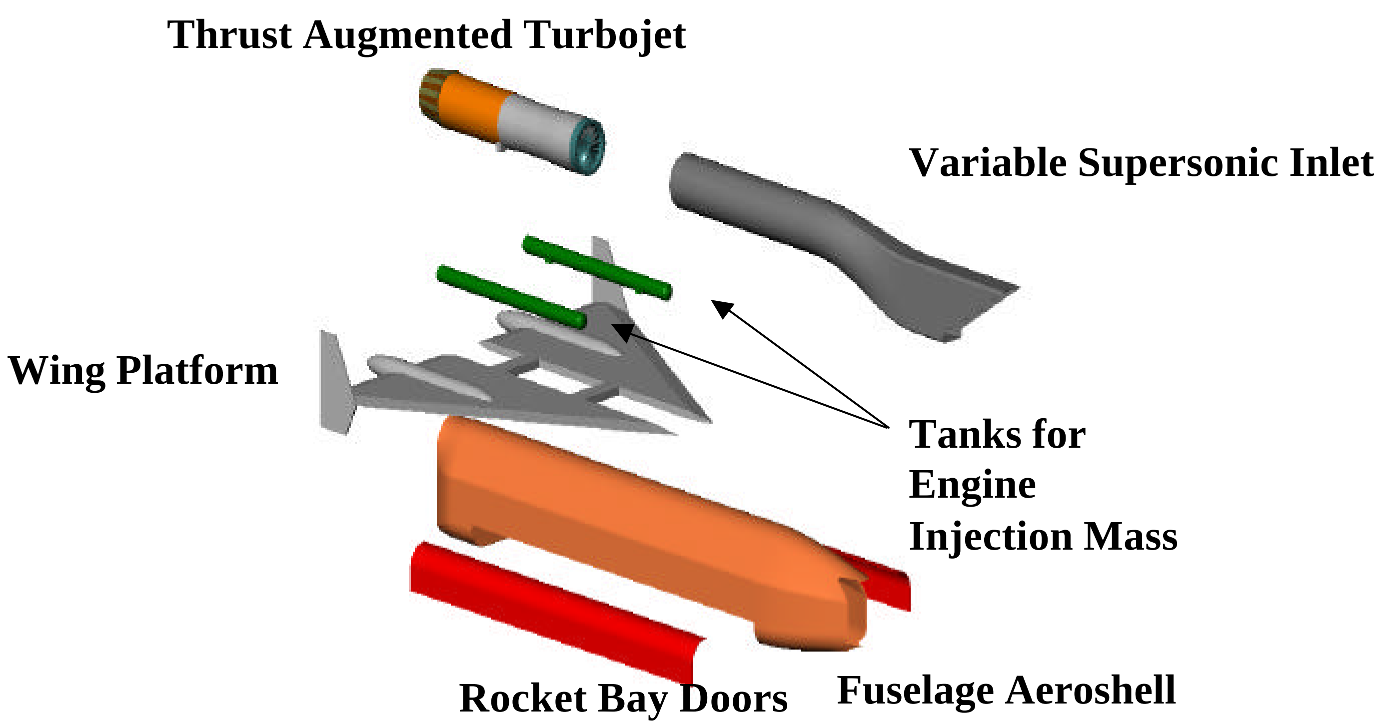
M_{Fuel}	**= 2900 kg**
M_{Empty}	**= 3750 kg**
$M_{Expendable\ Rocket}$	**= 2725 kg**



Front View

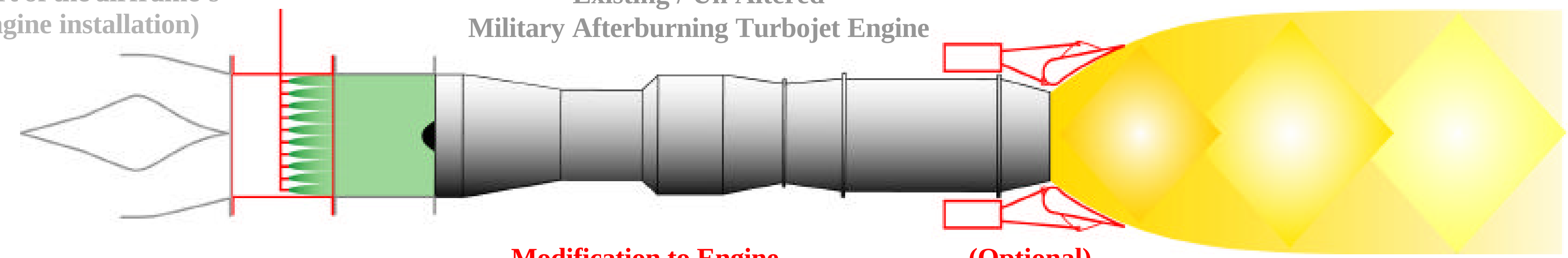
- **Several existing propulsion options are available:**
  - **Mass injected, pre-compressor cooled, (MIPCC) turbojet engines**
  - **Reusable rocket engines**
- **Developed from existing engine designs and airframe technology**
  - **Modified existing aircraft? (Possible)**
  - **New vehicle? (Fewer compromises, Better performance)**
- **Designed for loiter and zoom**

SIMPLE, CAPABLE, INEXPENSIVE



- Vehicle is not a complicated, or large airplane
- Designed for low development costs, recurring costs and low maintenance costs

MASS INJECTING & PRE-COMPRESSOR COOLING (MIPCC) ENGINES



- **MIPCC is a method of airframe installation for an existing afterburning turbojet engine**
  - **Enable short term operation to higher flight Mach number**
  - **Enable short term thrust augmentation**
  - **Enable short term operation to higher altitudes**
- **MIPCC enables the application of existing military jet engines to space launch / exo-atmospheric missions**

MIPCC BACKGROUND

- **Mass Injection, Pre-Compressor Cooling (MIPCC)**
  - Cools inlet airflow to increase air mass flow
  - Allows the engine to be flown nearer its design point
  - Proven to have minimum impact of engine health
- **A bibliography of PCC references is provided in your information CD-ROM**
- **Extensive development of PCC has been performed in the 50's and 60's**
  - Theoretical, experimental, flight test

DARPA POTENTIAL CONTRACTOR PROGRAM

Program allows participants varying levels of access to documents produced by the Defense community.

If you are not currently a DoD contractor, contact:

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DARPA Technical Information Officer

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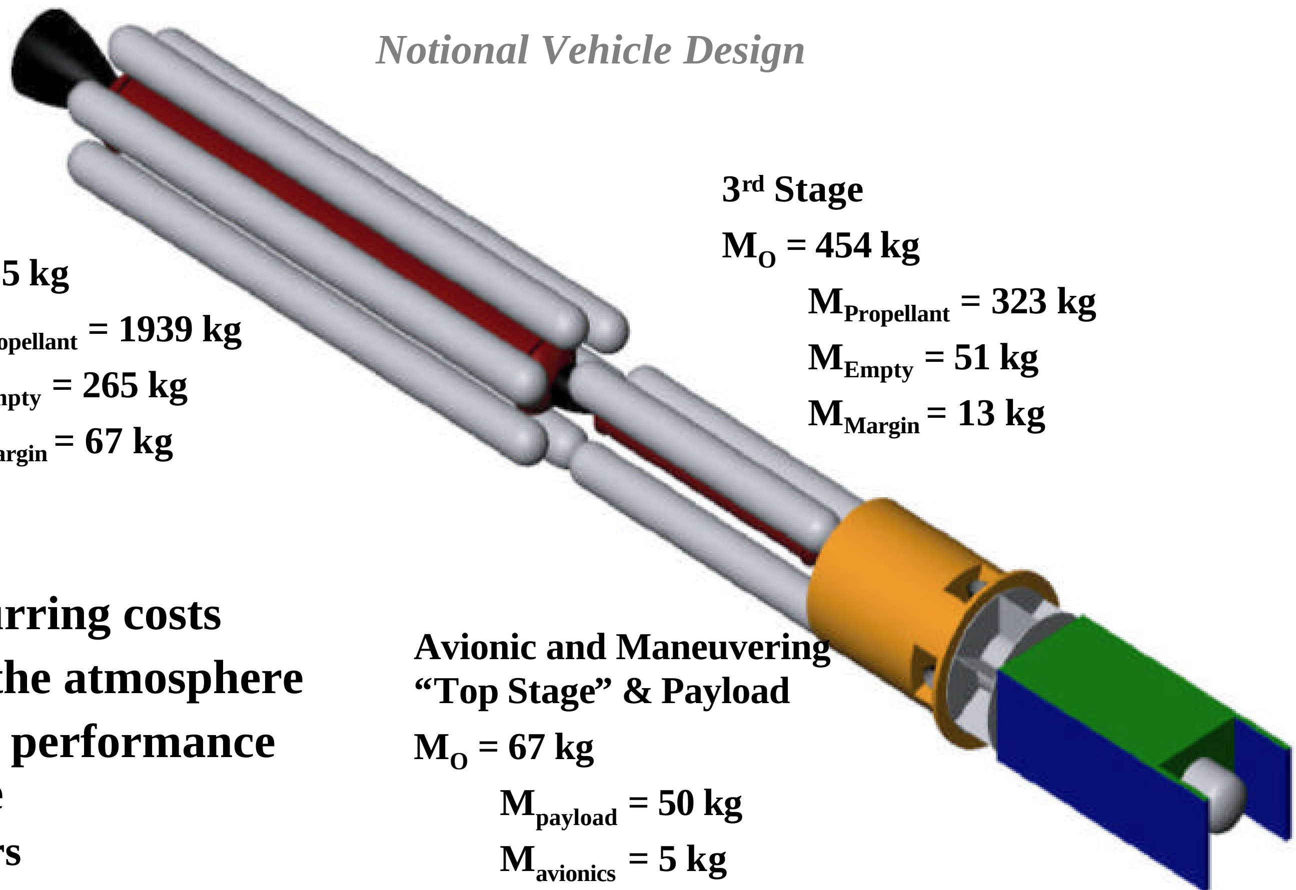
EXPENDABLE VEHICLE

Notional Vehicle Design



2nd Stage

M_O = 2725 kg

$M_{Propellant}$ = 1939 kg

M_{Empty} = 265 kg

M_{Margin} = 67 kg

3rd Stage

M_O = 454 kg

$M_{Propellant}$ = 323 kg

M_{Empty} = 51 kg

M_{Margin} = 13 kg

Avionic and Maneuvering "Top Stage" & Payload

M_O = 67 kg

$M_{payload}$ = 50 kg

$M_{avionics}$ = 5 kg

$M_{propellant}$ = 6 kg

M_{empty} =4 kg

M_{margin} = 1 kg

- **Designed for low recurring costs**
- **Only operates out of the atmosphere**
- **Several low cost/good performance technologies available**
  - **Hybrid rocket motors**
  - **Tactical missile based solid rocket motors**
  - **Pressure-fed liquid propulsion**
  - **Miniature pump-fed liquid propulsion**

CHALLENGES / APPROACHES

Low Cost ERV

Challenges

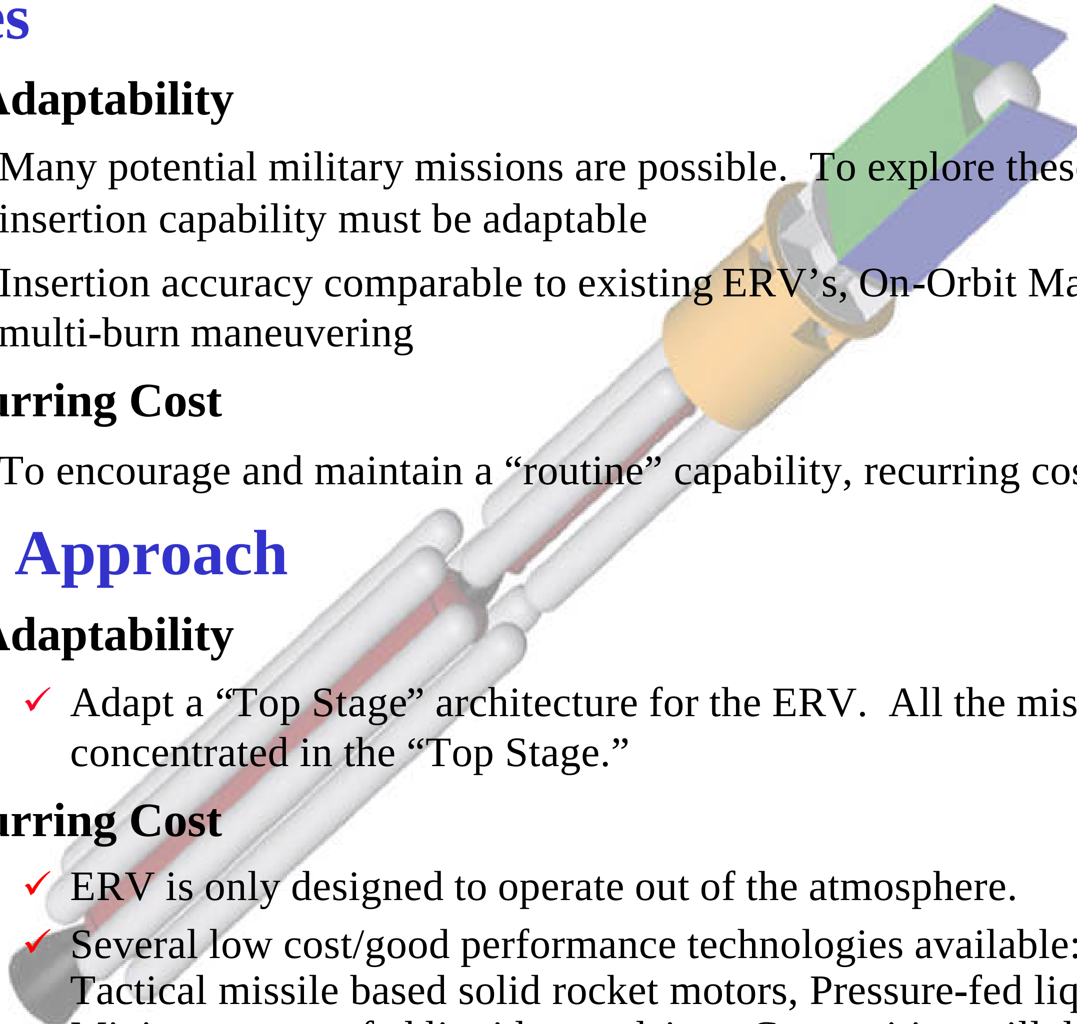
- **Mission Adaptability**

  Issue: Many potential military missions are possible. To explore these missions, the orbit insertion capability must be adaptable

  Goal: Insertion accuracy comparable to existing ERV's, On-Orbit Maneuvering > 300 mps, multi-burn maneuvering

- **Low Recurring Cost**

  Issue: To encourage and maintain a "routine" capability, recurring cost must be low



Technical Approach

- **Mission Adaptability**
  - ✓ Adapt a "Top Stage" architecture for the ERV. All the mission specific features are concentrated in the "Top Stage."
- **Low Recurring Cost**
  - ✓ ERV is only designed to operate out of the atmosphere.
  - ✓ Several low cost/good performance technologies available: Hybrid rocket motors, Tactical missile based solid rocket motors, Pressure-fed liquid propulsion, and Miniature pump-fed liquid propulsion. Competition will determine the "Winner."

Requirements and Goals for the

RASCAL P/L INTERFACE

RASCAL should be designed to keep things as simple as possible for the payload developer (the customer):

- **Mechanical interface**
- **Launch-site integration**
- **Specified environments**
- **Verification process**

Customer focus:

Minimize the indirect cost of launch as well as the direct cost.

LIMITATIONS ON P/L PHYSICAL PROPERTIES

Mass	100 kg or less (total payload)
Static envelope	1.2-m diameter by 3-m length
Dynamic envelope	To be derived by RASCAL developer from static envelope, fundamental frequency, and maximum payload acceleration
Mass moments of inertia	Limited only by mass and static envelope
Center of gravity	TBD m from interface plane (axial) and centered laterally to within 3 cm
Fundamental frequencies	50 Hz or above for axial and torsional modes; 40 Hz or above for lateral

These are goals for RASCAL design, not firm requirements

RELIABLE SOFT RIDE

- Structural loading adequately represented with rigid-body acceleration
  - Negligible excitation of the payload's high-mass modes of vibration
  - No need for coupled loads analysis, hence ...
    - Simplified structural design and verification
    - Minimal risk that the predicted loads increase after the payload is built
    - No need for a test-verified finite-element model for the payload

How?—Through design of the launch vehicle:

- **Loads-isolation mounting system**
  - Similar to the suspension system in your car
  - The relatively large payload envelope established as a goal would leave plenty of rattle space for the vast majority of payloads
  - Payload motion must be considered in design of RASCAL's control system
- **Engine design**
  - Gradual build-up and shut down of thrust instead of sudden changes

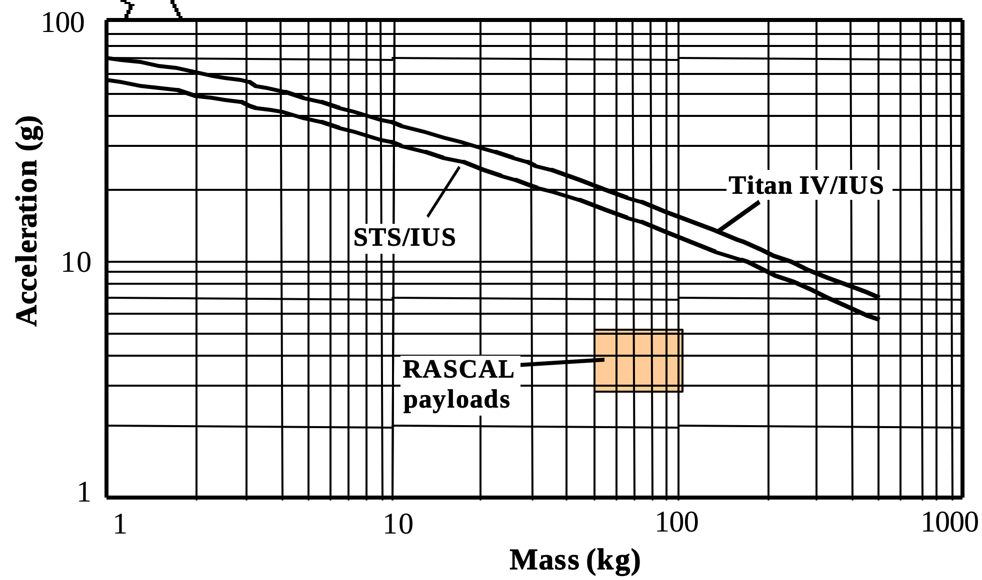
P/L ACCELERATIONS W/ EXISTING LAUNCH VEHICLES

Large payloads:

	Axial (g)	Lateral(g)
Atlas II	6.0	2.0
Delta	6.3	2.0
Shuttle	3.2	2.5
Titan IV	6.0	2.5

Loads isolation should keep payload acceleration more in this range for RASCAL

As payload mass goes down, expected acceleration increases as a result of vibration (less energy required to accelerate a small mass)



Trubert, Marc. November 1, 1989. JPL D-5882. "Mass Acceleration Curve for Spacecraft Structural Design."

SIMPLIFYING STRUCTURAL VERIFICATION FOR P/L

Envisioned process (simple and affordable):

- Design loads consisting of rigid-body accelerations in three axes
  - Applied separately
  - No angular acceleration (rad/s^2)
- Sine-burst test in three axes
  - Induces uniform acceleration; no vibration of payload
  - Corresponds to the design loads
- Random-vibration test in three axes
  - Same configuration as for sine-burst test
  - Should not drive the structural design
    - Acoustics, and thus random vibration, should be low for RASCAL
    - Tests should be for electronics and small devices
- No shock testing
  - RASCAL separation system should be "shockless"
  - Shock is potentially damaging to electronics
  - Shock testing is expensive

Target for RASCAL design:

±8-g acceleration applied one axis at a time should envelop the effects of launch loads on payload structures.

LUNCH
Be Back in 1 ½ Hours

Acquisition Strategy

SOLICITATION SCHEDULE

RASCAL SYSTEM

Draft Solicitation Release	1 November 2001
Solicitation Comments	19 November 2001
Final Solicitation Release	1 December 2001
Solicitation Responses Due	30 January 2002
Source Selection Complete	1 March 2002
Agreements Negotiations	6 Feb - 1 March 2002

MIPCC TECHNOLOGY

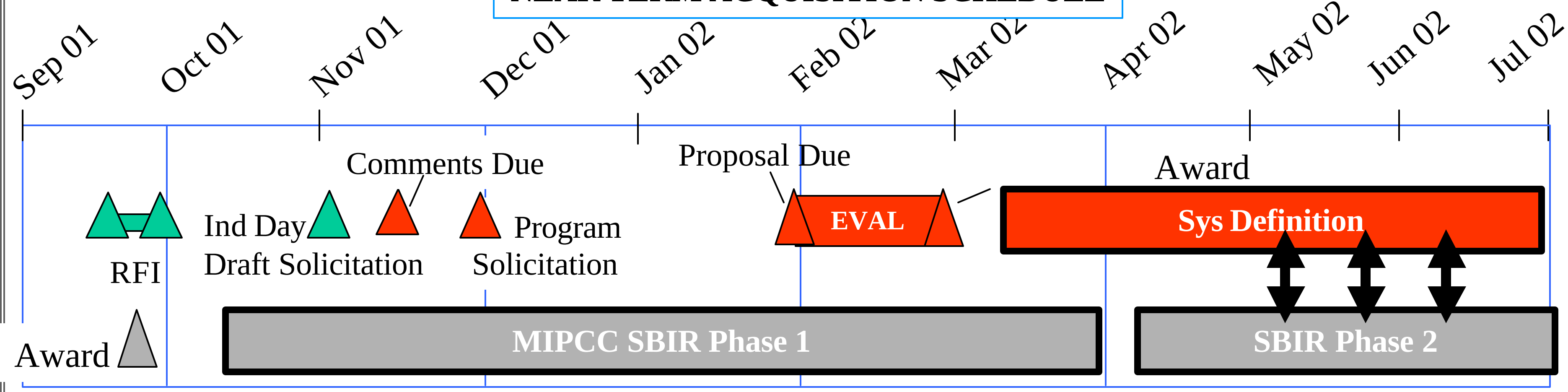
MIPCC SBIR Awarded (5)	1 October 2001
SBIR Phase II Award (Max of 2)	1 April 2001

SBIR RELAVENCE

Phase I winners

Accurate Automation Corporation
Advanced Projects Research Incorporated
HMX, Inc.
MSE Technology Applications, Inc.
Spath Engineering

NEAR TERM ACQUISITION SCHEDULE



Prototype Projects
Section 845

UNDER SECTION 845 OF THE NATIONAL DEFENSE AUTHORIZATION ACT (P.L. 103-160)

http://www.deskbook.osd.mil/default.asp
Search for: “845 OT”
Result:
Other Transactions (OT) Guide For Prototype Projects; January 2001

Prototype Projects Authority (aka Other Transactions for Prototypes)

- 10 U.S.C. 2371 was enhanced by Section 845 of National Defense Authorization Act of 1994 and further by Sec. 804…
- And, again modified by Section 803…
- The Director of DARPA and the Secretary of Military Departments may use "Other Transactions" for Prototype projects that are directly relevant to weapons or weapon systems proposed to be acquired or developed by the DoD.
- Currently 845/804 authority available through 2004

OT FOR PROTOTYPES

- What does the authority do for you?
  - Relief from FAR and supplemental regs
  - Flexibility to use “best” practices
- What are the limitations of the authority?
  - No LRIP or production (yet)
  - Must transition into a standard FAR contract
  - Considerations - competition, data rights, compliance with DoD 5000, documentation

OT FOR PROTOTYPES, Cont'd

- What doesn't apply to OT for Prototypes?
  - –Competition in Contracting Act (CICA)
  - –Truth in Negotiation Act (TINA)
  - –Contract Disputes Act
  - –Procurement Protest System
  - –P.L. 85-804 and indemnification
  - –Cost plus a percentage of cost prohibition
  - –Procurement Integrity Act
  - –Buy American Act (in part)

OT FOR PROTOTYPES, Cont'd

- Some laws still do apply
  - Criminal laws (false claims/statements)
  - Federal fiscal laws
  - Laws of general applicability (e.g. Title VI, Civil Rights Act)
  - General laws for doing business in the US (e.g. environmental laws, import/export control)

SECTION 803
"Cost-Sharing" Requirements

- Section 803 of the 2001 National Defense Authorization Act
- OT for Prototype requires:
  - "there is at least one nontraditional defense contractor participating to a significant extent" or
  - If no nontraditional defense contractor,
    - "at least one third of the total cost of the prototype project is to be paid out of funds provided by parties to the transaction other than the Federal Government."
      - Or
    - The senior procurement official for the agency (Director CMO, Tim Arnold) justifies the use of an OT that "provides for innovative business arrangements or structures that would not be feasible or appropriate under a contract."

OT FOR PROTOTYPES, Cont'd

- Food for Thought
  - Changes
    - No Government directed unilateral changes
    - No claims for equitable adjustment caused by changes
  - Termination
    - No "Termination for Default"
    - No "Termination for Convenience"

OT FOR PROTOTYPES, Cont'd

- Food for Thought *(cont'd)*
  - Costs
    - No mandatory cost principles or accounting standards
    - No certified cost and pricing data
- More Food for Thought
  - Subcontracting
    - Government system not required
    - No mandatory clause flowdowns, except where specified

OT FOR PROTOTYPES, Cont'd

- More Food for Thought *(cont'd)*
  - Management structure
    - Prime/subcontractor relationship not required
    - True teaming possible
  - Sound business judgment <u>absolutely</u> necessary
  - Contracts/Legal/Program/Financial <u>team</u>

The Safety Net is not There

OT FOR PROTOTYPES, Cont'd

- Sound business judgment is absolutely necessary
- Contracts/Legal/Program/Financial team is very important
- Other Transactions are different and present interesting cultural problems on both sides

CHARACTERISTICS OF A SUCCESSFUL TEAM

- Real business strategy
- Strategic synergy
- Excellent chemistry
- Sharp focus
- Commitment & support
- Conclusion: Win/Win

Break (15 Minutes)
Sign Up Sheet Closed

Program Solicitation
Phase 1

SOLICITATION OVERVIEW

- Use Agreements Authority
- Responses include:
  - Executive Summary
  - Technical Approach and Substantiation
  - Notional System Concept
  - Trade Study and Analysis Plan
  - Task Description Document (TDD)
  - Integrated Master Schedule
  - Technology Development and Assessment Plan (TDAP)
  - Management Plan
  - Program Team
  - Proposed Agreement with Attachments
  - Notional System Concept Sys Capability Doc.
  - Cost Response

TASK DESCRIPTION DOC.

- Detailed description of work which must be executed to accomplish Phase I
- Included as Article III of the offeror's proposed Agreement
- Structured in accordance with the offeror's Work Breakdown Structure (WBS)
- Can be modified to accommodate detailed technical changes (if there is no change in overall scope of the effort or cost impact)
- Changes must be approved in writing by the agreements officer

INTEGRATED MASTER SCHEDULE

- Tiered scheduling system that must correspond to the proposed WBS identified in the TDD
- Completed for Phase I and II to WBS Level 3 of the offeror's TDD
- Relates the specific detailed tasks and the amount of time expressed in calendar days necessary to achieve each significant functional accomplishment
- Contains:
  - Proposed milestones/events
  - Key tasks for each milestone/event
  - Accomplishment criteria for each task

TECHNOLOGY DEVELOPMENT AND ASSASSMENT PLAN

- Identify the top level metrics, processes, and system level performance and affordability trades
- Identify the critical and enabling Technologies, Processes and System Attributes (TPSAs) that must be validated and/or demonstrated
- Purpose is for Gov. to examine a range of competing technologies that could enable the RASCAL system.
- The plan shall describe the offeror’s process for identifying and evaluating competing technologies available from other government and industry R&D programs.

SOURCE SELECTION

- Government will enter into more than one Agreement
- Selection decision based on an integrated assessment of specific areas
- Evaluation will strive for maximum quantitative objectivity
- Government may reject responses that are unrealistic

EVALUATION PROCESS

- The Government Evaluation Team will conduct an initial reading of the proposals to become familiar with the offeror's approach and cost.
- The offeror may be requested to present key elements of the proposal to the Government Evaluation Team during a 2 hour oral presentation. The Government may ask questions to clarify parts of the proposal during these presentations.
- After receiving the oral presentation, the Government Evaluation Team will conduct an evaluation of the offeror's capability to achieve all phases, technical and cost proposals.
- The results of the proposal evaluation will then be presented to the Proposal Evaluation Decision Official for review and approval. The Proposal Evaluation Decision Official will sign the final evaluation decision which authorizes the Agreements Officer to conduct negotiations with selected offeror(s).

EVALUATION CATAGORIES

Category I: Well conceived and technically sound proposals pertinent to program goals and objectives and offered by a responsible contractor with the competent technical staff and supporting resources needed to ensure satisfactory program results at a reasonable, realistic price/cost

Category II: Technically and financially sound proposals which require further development

Category III: Proposals that are not technically sound or do not meet agency needs

AREAS OF EVALUATION

This is a technical competition for phase 1 to develop an affordable system with the Government. Proposal evaluation criteria will include:

- Product Capability and Technical Approach
  - Trade Study and Analysis Plan
  - Technical Assessment and Development Plan
  - Notional System Concept
- Management
  - Management Plan
  - Innovative Business Practices
  - Facilities
  - Program Team
    - Key Personnel
    - Team's ability to execute the program
    - Breadth and depth of the proposed team
    - Management construct
    - Past Performance
    - Proposed Agreement Terms and condition
- Cost

PROGRAM SUMMARY

Objective: **Develop a <u>Responsive</u>, <u>Routine</u>, access to space for <u>Small Payloads</u>**

Approach: **Blend of Reusable & expendable vehicles**

- **Reusable aircraft first-stage capable of <u>Exo-Atmospheric</u> flight**
- **Low-cost expendable upper stages**

Goals: **<u>75 kg to 500KM EO, anytime, any inclination</u>**

high flight rate, on-time performance, Low Cost

Payoffs: **Assured and timely access to space for U.S. defense**

Acts as an enabler for new missions:

–New military space missions
–BMDO targets
–Space Test Program (STP) payloads
–Space hardware qualification
–Orbital Express type missions

SUMMARY

Provide the United States military the ability to quickly launch space assets in support of tactical theatre commanders by developing and demonstrating a rapid, routine, small payload delivery system capable of providing flexible access using a combination of reusable and low cost expendable vehicle elements.

Questions and Answers Until 5:00 P.M. or Earlier

DIRECTIONS TO SOCIAL